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AMERICAN

DYESTUFF REPORTER

Volume 49 March 7, 1960 No. 5

DYEING MECHANISMS AND MOLECULAR SHAPE*

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University of Basle, Basle, Switzerland

INTRODUCTION

IN September 1958, a symposium was held in London, England, to commemorate the publication of a paper by August Kekulé, a hundred years ago. The symposium was organized by the International Union of Pure and Applied Chemistry, a sure indication that the publication concerned was one of major importance. Indeed, 1958 marked the first centenary of *structural chemistry*. It was with Kekulé's paper of 1858 that *spatial thinking* was introduced into organic chemistry. Kekulé was considering how carbon atoms were linked both among themselves and with other atoms. As a result, concepts were developed of the spatial arrangement and the shape of molecules.

A glance at organic chemistry over the past one hundred years shows that two results of Kekulé's work rapidly bore fruit on a very wide front: first, the theory of valence, especially as regards his postulate of quadrivalence of carbon; and second, the structural formula of benzene, which he propounded in 1865. The theory of valence made a decisive contribution to the development of organic chemistry generally; the benzene formula served as the basis for the systematic development of organic chemical technology, which, as is well known, had for its scientific point of departure the synthesis of organic dyes.

However, a third aspect of Kekulé's paper played only a subordinate part for decades to come. Insights into the spatial arrangement of molecules —leaving aside the problems of optical activity—have not been evaluated until more recent years. The influence of steric hindrance on the course of chemical reactions, the molecular structure of polymers, such as textile fibers, plastics, and albuminous proteins, the three-dimensional view of substituents on saturated carbon rings—all these are problems of spatial arrangement whose systematic investigation only began some 20 to 30 years ago or, as in many cases—conformation analysis, for instance—as recently as the present decade.

This paper sets out to illustrate, with a number of examples, the relevance of the shape of molecules to processes of textile chemistry in which they are involved. No claim is made to exhaustive treatment of the subject. The three problems discussed in the following have been selected with an eye to demonstrating both the possibilities and the limitations of research in this field. At the same time, they should clarify the basis of certain phenomena encountered in day-to-day textile wet processing.

STERIC INFLUENCES ON FASTNESS OF DYEINGS

Speaking generally, the fastness properties of dyestuffs are not exclusively dependent on chemical structure and may vary widely in different respects within the same class of dye. Often such divergence is due to seemingly insignificant changes in constitution of the dye while in many cases the substrate plays a decisive part. To illustrate the point, one may recall the striking difference in lightfastness of basic dyes applied to cotton as opposed to polyacrylonitrile fibers. Hence it is frequently more to the purpose to discuss fastness in terms of the dyeing obtained rather than in terms of the dye used. From the point of view of fastness, dye and fiber constitute an entity.

The role of these two factors—constitution and substrate—will now be illustrated by an example from the class of acid triphenylmethane dyes[2]. English wool dyers are apt to use acid triphenylmethane dyes of the Benzyl Cyanine 6B type (CI Acid Blue 83[3]) for the production of brilliant blues, in particular. Recently, however, more and more users have complained of a shade change to green after domestic laundering. Investigation showed that this was due to the increasing use of detergents containing peroxide. This dye possesses a very low degree of fastness to alkaline washing tests carried out with hydrogen peroxide.[4] It is curious to note that a dyestuff of closely related structure, namely Benzyl Cyanine G (CI Acid Blue 90) shows very good fastness to peroxide. Another surprising feature was that *neither* dye exhibited a change in shade when dyeings on Orlon and other polyacrylonitrile fibers were tested for fastness to peroxide.

In practice, the problem was solved by producing the shade of Benzyl Cyanine 6B with dyes that are fast to peroxide. But the dyer concerned was anxious that we should investigate the underlying causes of the difficulty he had encountered.

As a first step it can be shown that the shade change of Benzyl Cyanine 6B in the presence of peroxide occurs in the dye solution as well as on the fiber. The G brand is considerably more stable, also in solution. Kinetic measurements of solutions of the two

[1]Lecture given to the Swiss Association of Textile Chemists and Colorists (SVCC) at Zurich on November 29, 1958. This paper appeared originally in German in *Textil-Rundschau*, issue of March, 1959.

[2]The problem was brought to our notice by an English wool dyer through the good offices of J G Grundy, chief colorist of Ciba Clayton Ltd, Manchester, England.

[3]Designation according to *Colour Index*, 2nd Edition.

[4]This test (which is not yet accepted as standard) is carried out in the same way as SDC Washing Test No. 2, 0.2 g sodium perborate being substituted for the soda. It is not identical with the test for fastness to peroxide bleaching.

dyes in the presence of perborate revealed that, under the conditions of test selected, type 6B oxidizes at 48 times the rate of Benzyl Cyanine G. This warrants the conclusion that poor fastness to peroxide is an intrinsic property of the dye and not the result of interaction between the fiber and the dyestuff.

The structural formulas of the two dyes show that Benzyl Cyanine G differs from Benzyl Cyanine 6B only in the methyl group carried by each of two central benzene rings. (See Figure 1)

In most cases, the replacement of a hydrogen atom in a benzene nucleus by a methyl group does not greatly affect the properties of the dyestuff, which stands to reason since this substituent has a very low degree of reactivity. The difference in the results of the peroxide tests is all the more surprising.

This is where a consideration of molecular shape becomes helpful. It is essential to realize that in Benzyl Cyanine 6B the three central benzene rings lie virtually in the same plane. If methyl groups are substituted for two hydrogen atoms to give Benzyl Cyanine G, a particle is seen to result whose center, ie, the triphenylmethane grouping, is of quite different shape (Color Plate A): the three benzene rings are twisted relative to one another like the blades of a propeller while the two methyl groups partly cover the central carbon atom. The conformation of conjugated systems is today known to be connected with absorption in the ultraviolet and visible light regions of the spectrum and therefore affects the shade of dyestuffs. The departure from coplanar arrangement of the three benzene rings due to conversion of the dyestuff to Cyanine G is responsible for the change in shade.

But what is the connection between this change in configuration and peroxide fastness? In triphenylmethane compounds the most reactive site of the entire ion is that of the central carbon atom. The twisting of the rings out of coplanarity caused by the introduction of the two methyl groups render this site less accessible, that is, less recative. Combination with any reagent occurs more slowly. Hence the peroxide radicals react less fast with the ion of the G type than with the ion of Benzyl Cyanine 6B by the factor mentioned earlier. If a dyeing produced with Cyanine G is treated with detergents containing peroxide, the concentration of the peroxide and the contact time normal in laundering are not sufficient to destroy substantial portions of the dyestuff. However, more drastic conditions, such as those of the peroxide bleach, will largely destroy even a Cyanine G dyeing.

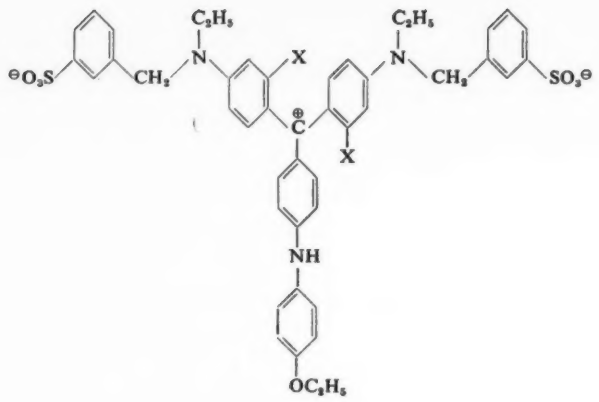


Figure 1
X = H: Benzyl Cyanine 6B
X = CH_3: Benzyl Cyanine G

We may summarize by saying that replacement of hydrogen by methyl affects the coloristic behavior of Cyanine dyeings although in themselves the two methyl groups substituted possess a low degree of reactivity. The *steric situation* alone is responsible for the difference in fastness observed in the peroxide washing test.

But how explain the substantially higher fastness to peroxide of Cyanine 6B when applied to polyacrylonitrile fibers? Is it to be traced to a specific interaction between the dyestuff and the fiber? That, it will be remembered, is the probable reason for the surprisingly high lightfastness of basic dyes on this substrate, as recently shown by Wegmann (*1*).

It may be stated right away that our investigations have revealed no such interaction of the dyestuff with the fiber which would explain the improved resistance to peroxide washing on Orlon. The latter property is due to the behavior of polyacrylonitrile fibers towards cations and anions generally. We propose to discuss this characteristic briefly although it is not directly connected with steric influences on dyeing mechanisms.

A rapid review of the dyeing methods successively developed for this type of synthetic fibers will bring out their specific characteristics. When Orlon was first marketed about ten years ago, it caused dyers some notorious headaches since it was difficult to dye with the conventional classes of dyes, and only to pale shades. The first successful advance was the cuprous ion method discovered by Feild and Fremon (*2*). Polyacrylonitrile fibers treated with cuprous ions show considerable affinity for anionic dyes, acid wool dyes in particular. This somewhat problematical method was later placed on a more reliable basis by means of the Sandocryl process (*3*).

The surprising discovery that basic dyes are outstandingly suitable for Orlon was made soon after. Attention was, however, focused on the unprecedented degree of lightfastness achieved. Practically no thought was given at first to the possible reasons for the affinity of this class of dyes for Orlon.

Coloristic experience gained since makes it clear that cations such as basic dyes and metal ions are readily adsorbed on to Orlon fiber while anions possess very little, if any, affinity for this substrate. This is suggested by the behavior of acid, direct, sulfur, and vat dyes. As is well known, the latter dyes, when in reduced form, are also taken up by the fiber as anions.

That the positive or negative sign of the ions is decisive can be shown by yet another method (*4*). It is well known that chromium ions can be used to produce both cationic and anionic complexes in conjunction with simple, colorless components. It is found that the positively charged complexes are taken up by these fibers while the negatively charged complexes are not. This goes to prove that it is not the metal but the sign of the ion which is decisive.

These largely qualitative observations were confirmed in 1957 by exact physico-chemical data obtained in investigations on the dyeing mechanism of basic dyes on Dralon fiber carried out by Glenz and Beckmann at Leverkusen[5] (*5*). Glenz and Beckmann

[5]I owe thanks to Dr Glenz of Farbenfabriken Bayer, Leverkusen, Germany, for private communication of much valuable information on his relavent work.

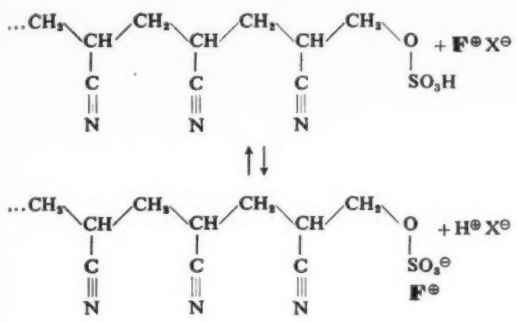
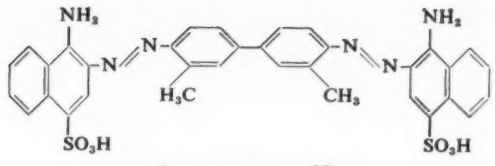


Figure 2



Benzopurpurine 4B

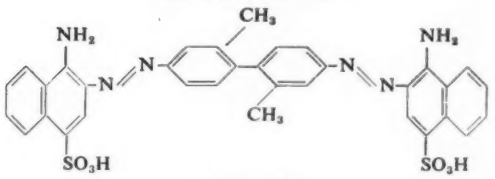


Figure 3
meta-Benzopurpurine

determined dyeing equilibria and evaluated the results obtained thermodynamically. They were able to show that the dyeing mechanism is governed not only by a solution process but, above all, by a process of stoichiometric salt formation between a dye cation and an anionic group of the polyacrylonitrile fiber (Figure 2). It was found that sulfo-group-containing catalysts used in the polymerization of acrylonitrile, eg, persulfate, are incorporated in the chain molecule. These groups dissociate to produce the anionic sulfonate sites of the fiber at which salt formation with the dye cation is now rendered possible.

It now also becomes apparent why Orlon possesses so low a degree of affinity for anionic compounds, such as acid, direct, and vat dyes. For one thing, there are no suitable sites available for salt formation and, for another, the negatively charged groups already present repel the dye anions by purely electrostatic action.

This repulsion is particularly marked in an alkaline medium. That is why the perborate anions of an alkaline peroxide wash solution penetrate Orlon fiber with much greater difficulty than they do wool or other textile substrates. It follows that the superior fastness to peroxide washing of Benzyl Cyanine G on Orlon is not an intrinsic property of the dye; it must be attributed to interaction of the wash liquor with the fiber.

The high degree of affinity of polyacrylonitrile fibers for cations is also of importance apart from the actual dyeing processes. In addition to dye cations and positive metal ions, simple *amines* are adsorbed on the fiber (as ammonium ions). This applies in particular to *ammonia* solutions. The sensitivity of these fibers to ammonia may lead to severe fiber damage as is demonstrated by treating an Orlon fabric for one hour at the boil in an ammonia solution. The fabric is largely destroyed. That this is not simply due to the action of the alkaline medium, in other words to its pH, may be gathered from a parallel test where the same pH is ensured by means of a phosphate buffer. A sample treated in this manner remains unaltered—at least to outward appearance.

While treatments with ammonia are not too common, it may be useful to bear this comparative test in mind in certain commercial finishing operations applied to Orlon.

THE CAUSES OF SUBSTANTIVITY

Chemists and colorists have studied the causes of the affinity of cellulose ever since the discovery, in the 1880's, of the first dyes capable of dyeing cotton without the need for mordanting. The problem as such was of intrinsic scientific interest; at the same time practical results were, of course, also hoped for in the shape of new types of direct dyes. Of the many theories advanced over the years we will mention only two, both of which have a bearing on the subject of the present paper. Following the elucidation of the structure of cellulose by Haworth (*6*) and the determination by Meyer and Mark (*7*) of the size of the unit cell of this chain molecule by means of X-ray diffraction diagrams, Paine and Rose (*8*) drew attention to a significant circumstance.

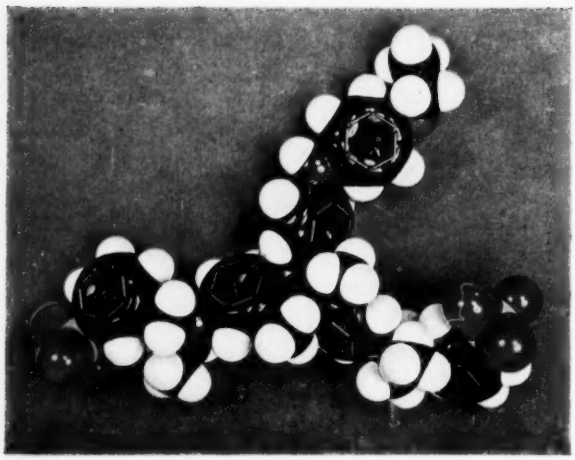
Paine and Rose believed that substantivity resulted from the formation of hydrogen bonds between the primary hydroxyl groups of the cellulose and hydroxyl or amino groups of the direct dyes applied. This they considered probable because the unit cell of cellulose—cellobiose—according to Meyer and Mark has a repeat distance of 10.3A and the spacing between amino groups of the classical direct dye, Congo Red, is 10.8A.

Our surprise may, therefore, be imagined when, a few years back (*9*), on examining a scale model of Congo Red (CI Direct Red 28) we found that the distance between these groups is not 10.8A but considerably more, namely about 14.3A. This cast doubt on the validity of Paine and Rose's theory of hydrogen bonds.

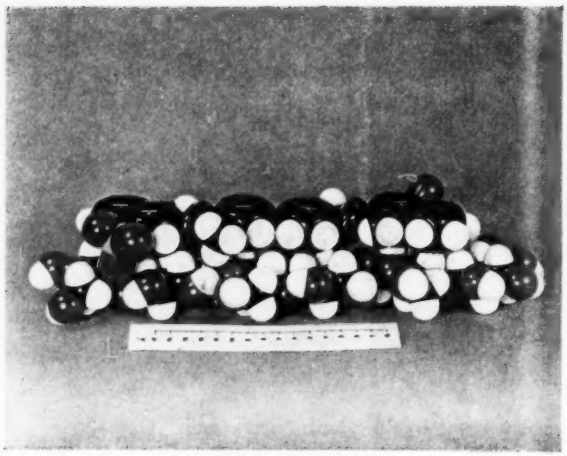
However, this observation by no means proved that hydrogen bonds have no part in substantivity. A scale model of cellulose will show that the number of hydroxyl groups existing on the surface of this chain molecule is large enough to include almost any distance between two oxygen or hydrogen atoms to fit the distances between the corresponding groups of the dye. The element of uncertainty thus introduced into the problem of hydrogen bonding has been pointed out by Robinson (*10*)—with good reason.

Before going into this question, mention must be made of the work done in the 'thirties by Hodgson (*11*), Ruggli (*12*), and Schirm (*13*). These textile chemists had recognized that substantivity increases with the number of conjugated double bonds.

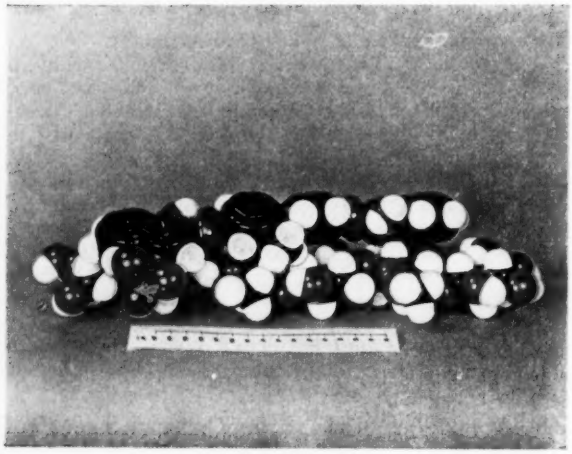
The concepts developed by theoretical organic chemistry in the course of the 'thirties have led to the conclusion, among others, that the interaction of conjugated double bonds becomes fully effective only if the atomic groupings involved a planar structure. The relevance of coplanarity is exemplified by a number of conclusive instances in the series of direct dyes, as Hodgson (*11*) was presumably first to note. Thus, in Benzopurpurine 4B (CI Direct Red 2) substantivity is materially reduced if the methyl groups are in the meta position to the azo residues (Figure 3). This is due to the fact that the two benzene nuclei of the diphenyl middle component are distorted out of the plane because of steric hindrance—the dye molecule no longer lies in one plane, its two halves now forming an angle.



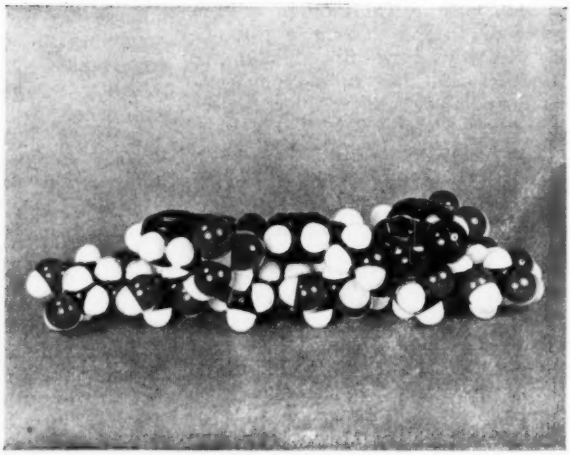
Color plate A
Scale model of Benzyl Cyanine G (central carbon atom is green)



Color plate B
Adsorption of Benzopurpurine 4B on cellulose



Color plate C
Adsorption of meta-Benzopurpurine on cellulose



Color plate D
Intermediate product of fixation of cyanuric reactive dye with two methylene groups

Color plates B and C show scale models of these two dyes when adsorbed onto a cellulose surface. Type 4B, which is of planar structure, clearly fits closer to the flat surface of the linear cellulose molecules than does meta-Benzopurpurine, which is distorted out of the plane.

Although this proved the bearing of coplanarity on substantivity, the connection with the number of conjugated double bonds was not yet demonstrated conclusively. Ruggli (*12*), for instance, showed that a monoazo dye from J acid is less substantive than the corresponding product in which the amino group of the J acid has been diazotized a second time and coupled with a second equivalent of J acid. This increases the number of the conjugated double bonds, it is true, but the new dye also contains twice as many azo, sulfo, and hydroxyl groups. It would therefore be possible to assert, not unreasonably, that improved substantivity results, say, from the increase in the number of azo bridges.

This provided the starting point for the investigations now being carried out by Miss R Wirz in the Institute of Dyestuffs Chemistry at the University of Basle. In recent years, preparation of a large number of carotenoids has become possible in connection with the synthesis of Vitamin A by Isler and his coworkers (*14*) of Hoffman-LaRoche at Basle. Synthetic beta-carotene (*15*), for instance, is now available as a food dye. We were particularly interested in the possibility of obtaining *bixin* and *crocetin*—the only natural dyes substantive to cotton. The structural formulas show these to be essentially polyenes with esterified or free carboxyl groups at both ends. (Figures 4a and 4b). The disposition of the

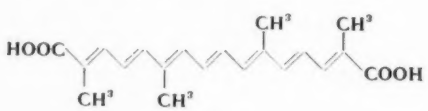


Figure 4a
Crocetin (stable)

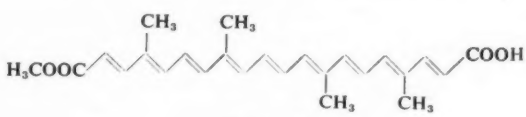


Figure 4b
Bixin (stable)

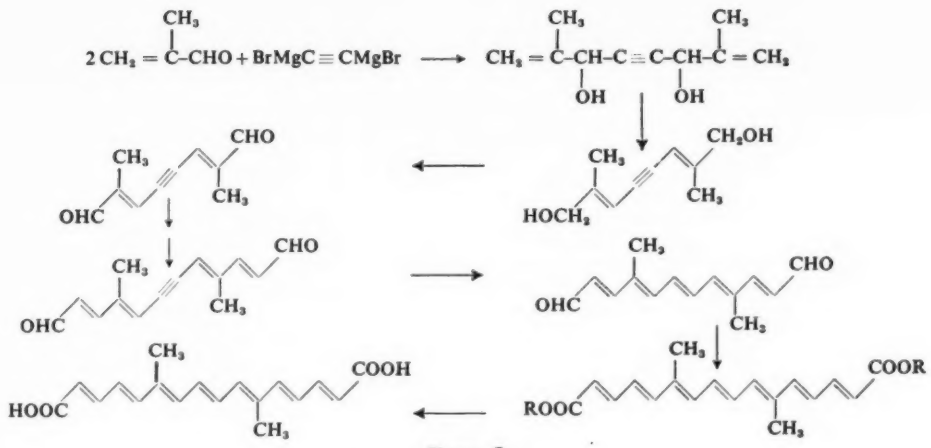
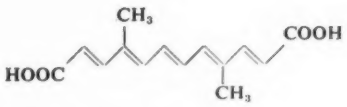
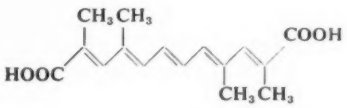
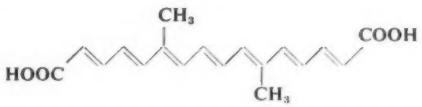
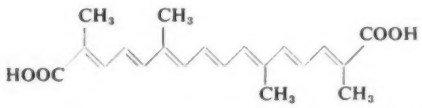
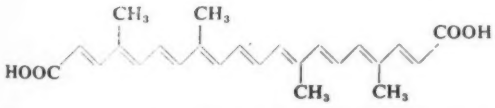
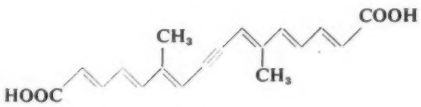
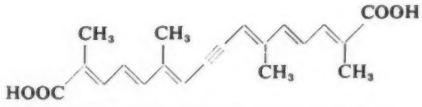


Figure 5
Preparation of C_{18}-dicarboxylic acid

methyl groups is characteristic of these carotenoids and in accordance with Ruzicka's isoprene rule (*17*).

Bixin and crocetin differ mainly in the length of the system of conjugated double bonds. Following the successful synthesis of these two compounds by Isler and coworkers, we expanded the series with a number of shorter, vinylogous polyene dicarboxylic acids formulated on the same principles. The route adopted to bring about the synthesis is exemplified in Figure 5. The formula shows that reactions have to be applied which are conventionally used in the chemistry of natural organic substances but not familiar in classical dyestuff chemistry.

TABLE I
Substantivity of polyene dicarboxylic acids

		Double and triple bonds	Relative Substantivity $\frac{D_f}{D_s}$
	C_{18}	5	0.11
	C_{18}	5	0.11
	C_{18}	7	0.24
	C_{20}	7	0.36
	C_{20}	9	0.59
	C_{18}	6 + 1	0.49
	C_{20}	6 + 1	0.53

The series of compounds synthesized by this or similar routes is listed in Table I. Five different polyene dicarboxylic acids having five, seven, and nine conjugated double bonds, and two analogous substances with a central triple bond have been applied to cotton under standard conditions. The last column indicates the ratio of dye on the fiber (D_f) to dye still in solution (D_s) after equilibrium has been attained. Uptake of dye is seen to increase with the length of the polyene chain, in other words, substantivity is increased. As the members of the series tabulated are strictly comparable, the table proves conclusively that the length of a flat atomic grouping determines the degree of affinity.

The values given are relative measures of substantivity. Uptake of a direct dye by cellulose fibers constitutes an adsorption mechanism, equilibrium being established between the dye taken up by the fiber (D_f) and the dye in solution (D_s). The greater the shift in equilibrium in favor of the adsorbed dye, the greater the degree of substantivity. The process must therefore be treated like any other equilibrium mechanism (acid/base, redox, complex, or other). The ratio of the amount of dye on the fiber to the amount of dye in solution thus affords a measure of substantivity, provided all the other

Figure 6

variables (temperature, salt concentration, liquor ratio, etc) are kept constant. If the mechanism of the dyeing process under study is fully known, the above ratio enables the exact physico-chemical measure of substantivity to be calculated, that is, its chemical potential expressed as kcal/mole or other unit of energy per mole of dyestuff (*18*). Where comparison under constant conditions is made between chemically related dyes such as these polyene dicarboxylic acids, thermodynamic treatment fails to give useful results beyond the relative values indicated. We would stress, however, that prior to carrying out any of the measurements listed, care was taken to establish that the system was at equilibrium. This necessary condition has been disregarded in many publications on substantivity reporting determinations of dye uptake, say, after one or one-and-one-half hours. Any conclusions drawn from such data are necessarily wrong from the outset.

We now revert to the question whether the presence of hydrogen bonds is an essential feature of substantivity. It is possible for these polyene dicarboxylic acids, too, to have hydroxyl groups of the cellulose attached to the lone electron pairs of the dye's carboxylic acid residues whereby substantivity is increased. There can hardly be any doubt that the experiments discussed go to show the importance of the number of double bonds present. They provide no clue, however, as to whether hydrogen bonds also play a part, as the second factor.

Consequently, we wanted to find out if a compound comprising a system of conjugated double bonds and therefore of planar configuration but incapable of hydrogen bonding would also prove to be substantive. To this end, H H Bosshard[a] tested the behavior towards cotton of benzidene whose two amino groups had been made quaternary. All the electron pairs of the two nitrogen atoms (see Figure 6) are shared by the methyl groups. This being a salt-like linkage, it is water-soluble. We then treated cotton with a solution of this compound after the manner of a direct dyeing and used ultra-violet absorption to test if any of the compound was being adsorbed onto the cellulose. Within two hours, at room temperature, 37% of the compound used had been taken up by the cellulose. Since, as already mentioned, it is not possible for this diammonium ion to be linked by hydrogen bonds, the experiment proves that scope for hydrogen-bond information is not a necessary condition of substantivity. It must be emphasized, however, that the experiment does not prove that no hydrogen bonding to cellulose takes place in direct dyes. What may be safely concluded, nevertheless, is that other causes—in our case the coplanarity of the diphenyl rings and, presumably, the electrostatic attraction of the cations to anionic groups of the cellulose—are by themselves sufficient to confer affinity for cellulose.

[a]Research laboratories of the Dyes Dept, Ciba Ltd, Basle, Switzerland.

STUDIES IN THE UPTAKE MECHANISM OF REACTIVE DYES

The group of reactive dyes for cellulosic fibers which first became known in 1956 is in various quarters regarded as a turning point in dyestuffs chemistry and textile processing. Contrary to dyeing with direct dyes, application of reactive dyes results in irreversible chemical linkage between dye and fiber. When a direct dye is stripped from the fiber the colorant is recovered in its original form. With this new group of products, however, the dye is fixed on the fiber in such manner as to make it impossible to strip the dye unchanged. There is reversible equilibrium between the dyeing and stripping processes.

The natural assumption is that the dyeing mechanism consists in the formation of a covalent bond between dye and fiber. But as yet there is no conclusive proof of this. Although we agree with Vickerstaff, Wegmann, and others (*19-21*) in supposing that when the dye goes on to the fiber the reactive group is exchanged for a hydroxyl group of the cellulose by a substitution reaction while in stripping there is hydrolysis, that is, an exchange for the OH group of water, we will treat this hypothesis with reserve for the time being.

As is well known, the reactive groups of Procion and Cibacron dyes consist of one or two chlorine atoms attached to a triazine (cyanuric) ring. With Remazol dyes a sulfuric acid ester of a beta-hydroxethyl sulfonic group ($-SO_2-CH_2-CH_2-O-SO_3H$) is responsible for the reaction (*21*). Chemical linkage takes place by the exchange of the chloride of sulfate ion of these residues for a hydroxyl group of the fiber or the water.

Vickerstaff (*19*) had first reported that the rate of combination of the reactive groups with the hydroxyl groups of the cellulose was roughly a hundred times that with water. Later, the figure had to be revised, the ratio of reaction rates being not of the order of 100 to 1 but of just about 3 to 1. In our view, even this ratio must be regarded as highly surprising. One would, in fact, expect such a reactive chlorine atom to react much faster with water than with cellulose. Homogeneous combination is possible with the molecules of the solvent (water) while linkage with the cellulose represents a heterogeneous reaction; and, as is well known, the latter type occurs less readily, as a rule.

Thus, we felt that here was particular interest in investigating this surprising state of affairs. In the following, we shall examine the question why, contrary to expectation, these reactive groups combine so readily with the hydroxyl groups of cellulose.

We shall first consider combination of the reactive groups of cyanuric chloride dyes (Procions and Cibacrons) in some detail with the aid of scale models. These reactions are of the nucleophilic aromatic substitution type, the triazine ring being a heterocyclic analogue of benzene. Meisenheimer (*22*) long ago showed that such substitutions proceed by way of an *intermediate*. A study of this type of reaction has been made in our Institute jointly with B Bitter, taking cyanuric chloride as representative. The latter was found to exchange its chlorine atoms for one $X^{\ominus}$ particle in the manner illustrated in Figure 7.

$X^{\ominus}$ is any base, eg, a hydroxyl ion or (as in B Bitter's experiments) a primary or secondary amine. Figure 7 shows that the base first adds onto the reactive carbon atom to form the intermediate shown in the middle. In the starting product (cyanuric chloride) the chlorine atom to be exchanged occupies the same place with all the other atoms of the molecule. In the intermediate, however, it is situated behind the plane of the six-membered ring. Correspondingly, particle $X^{\ominus}$ is positioned in front of the plane. In the lower row of Figure 7 these compounds are represented in an oblique lateral view relative to the plane of the ring. In cyanuric chloride the carbon atoms are bound to three other atoms at an angle of 120° (so-called sp^2-hybrid-

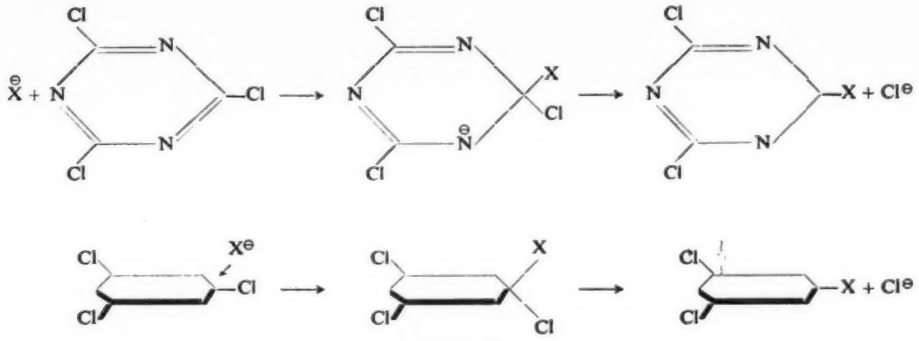


Figure 7
Mechanisms of the cyanurchloride substitution

ized or trigonal carbon). By contrast, the reactive atom of the intermediate is an sp^3-hybridized or tetrahedral carbon (bonding to four other atoms). Only when the chloride ion splits off does the amino group come to lie in the same plane as the triazine ring whereby the same molecular configuration as that of the starting product is obtained.

There is no immediate connection between these considerations and the dyeing mechanism. What we have done is to discuss the behavior of a cyanuric chloride derivative in homogeneous solution in mechanistic terms. Such a discussion is, however, essential to an understanding of chemical linkage between reactive dyes and cellulose. The dyeing mechanism consists of *two fundamentally different steps*. In a first step, the dye is adsorbed on the cellulose surface like a direct dye. Although in terms of molecular structure reactive dyes generally show a closer resemblance to acid wool dyes, it is an established fact that they all have some degree of substantivity, even though small.

If in this primary phase the dye particle comes to lie flat on an intermicellar cellulose surface, the reactive carbon atom is placed in the immediate vicinity of hydroxyl groups of both cellulose and water. It could be stated very loosely that on one side the carbon atom is bounded by cellulose and on the other by water exclusively. But to conclude that in this seemingly identical concentration of cellulose and water the reaction ought to proceed with water as readily as with cellulose would no doubt be erroneous in several respects.

Why, the situation being what it is, the reaction of the carbon atom should take place preferentially with a hydroxyl group of the cellulose and not with one of the water will become plain if we recall the intermediate of cyanuric chloride substitution. It was seen that, where the amino group combines with the carbon atom from behind the plane, the chlorine atom is displaced to the front. Now if a hydroxyl group of the water acts on a dye particle which is adsorbed on the cellulose, the chlorine atom ought to be displaced in the direction of the cellulose. This, however, is hardly possible because the chlorine atom "bumps against" the cellulose surface, so to speak. Hence there is no reaction with water. Conversely, the chlorine atom is able to dodge in the direction of the water if a hydroxyl group of the cellulose reacts with the carbon atom. Consequently, formation of the intermediate becomes possible; once formed, it continues to react, the carbon atom splitting off as the ion and the oxygen atom of the cellulose attaching itself firmly to the carbon of the triazine. This mechanism is represented in Figure 8, which also shows that the hydroxyl group of cellulose to be substituted combines as the *anion*. A hydroxylate residue ($-O^{\ominus}$) is a much stronger base than the $-OH$ group; therefore, its reactivity is higher. The part played by additions of alkali (soda, etc) in applying reactive dyes has been shown by Weston (*23*) to consist, not in a specific action on the dye particles, but in increasing the number of ionized hydroxyl groups of cellulose.

This mechanism provides a simple explanation of the surprising readiness of these reactive dyes to combine with cellulose and of the fact that hydrolysis occurs to a very small extent only. At the same time, the explanation suggested is in accord with the findings confirmed time and again in studies of other nucleophilic aromatic substitution reactions of the S_N2 type. Nevertheless, we must not imply that we have proved the mechanism. Working hypothesis and objective proof should not be confused however attractive and convincing the interpretation offered by the hypothesis.

Accordingly, we have begun a search for experimental ways of proving the above hypothesis, and the problem is being tackled from a number of angles at the Institute of Dyestuffs Chemistry. In the following we shall describe the line of investigation followed by B Krazer as part of this program.

The crucial point in the mechanism postulated here consists in the first step, viz, in bringing the cyanuric ring, and more especially the reactive carbon atom, close to the cellulose surface.

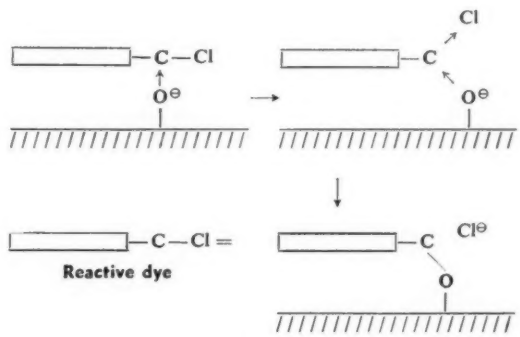


Figure 8

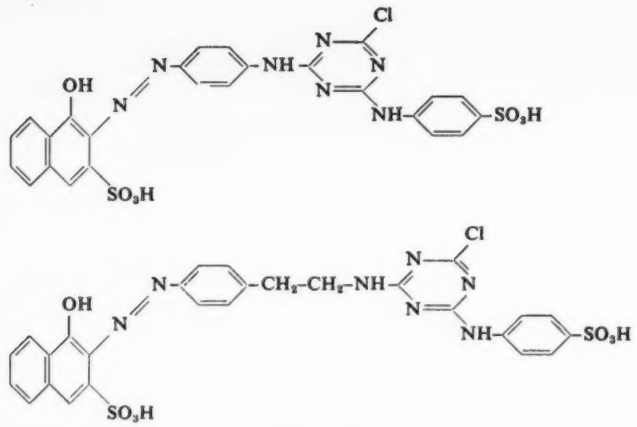


Figure 9

It may happen, however, that the carbon atom of the cyanuric ring whose chlorine atom is to be exchanged for the hydroxyl group of the cellulose does not come to lie exactly opposite an oxygen atom of cellulose. Where this fails to come about, no reaction with the fiber will take place. A possible solution, it might be thought, would be to shift this entire dye molecule for some distance along the fiber surface. However, this is not likely to prove very easy since the Van der Waal's forces underlying substantivity militate against it. The operation might be feasible where the forces mentioned are weak. That circumstance probably explains, or at least does so in part, why highly substantive reactive dyes show poorer fixation than those with moderate affinity for cellulose.

It is not necessary, though, to shift the entire dye particle until the reactive group occupies the correct position. If between the reactive/center and the color-producing part of the molecule (which also effects the affinity for cellulose by reason of its flat configuration) there exists a flexible grouping, the reactive carbon atom can be moved into the most favorable position without shifting the entire dye particle.

In this context, a quantitative study was made of the dyeing behavior of the two reactive dyes represented in Figure 9. The first dye contains one replaceable chlorine atom on the cyanuric residue, ie, it is a hot-dyeing product of the Procion H or Cibacron type. The second dye is a higher homologue and identical with the first except for the link between the chromogenic group and the cyanuric ring consisting of two interposed methylene groups. As a result the two parts of the molecule are free to rotate about these members in almost any direction. The latter enable the reactive portion of the molecule to travel a short distance in all senses. The reactive carbon atom as well as the chlorine to be substituted are thus brought close to the cellulose hydroxyl. One therefore expects this dye to have a higher degree of fixation on cellulose.

The experimental findings are in accord with the hypothesis: Under identical dyeing conditions 40% of the amount adsorbed by the fiber combines with it chemically in the case of the first dye; for the second dye the proportion is 55%.

Color plate D represents the intermediate product resulting from the reaction of the cellulose with the dye containing two methylene groups. The chlorine atom is seen to be distorted out of the plane of the triazine ring and the oxygen of the cellulose has attacked the carbon atom of the ring. The increased reactivity of this dye (as compared with the analogous compound lacking the methylene groups) is essentially due to the fact that these flexible links enable the reactive portion of the dye particles to rotate away from the color-producing portion. The benzene azonaphthol side (left) and the triazine group (front) clearly do not lie in the same plane. Contrary to the first dye, the triazine ring is enabled to occupy a position which is particularly favorable for reaction with the cellulose.

This, we believe, has brought us a step closer to a true understanding of the chemical principles underlying the dyeing mechanism of reactive dyes. Several other experimental studies still in progress should yield additional information on this adsorption and fixation mechanism. We hope to report on these at a later date.

Determination of the ratio of adsorbed to fixed dye by means of quantitative extraction methods—the principle applied in this study—may be expected to prove useful in the detailed examination of one of the most important problems still facing the user of reactive dyes. We refer to the problem of simple, rapid, and complete removal of unfixed dye, which, as is well known, still presents considerable difficulty.

ACKNOWLEDGMENT

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38th National Convention———

DYEING AND FINISHING SPECIAL BLENDS OF ARNEL WITH ACRYLICS AND ARNEL WITH COTTON IN CIRCULAR KNIT APPLICATION Part III*

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A Division of Celanese Corporation of America

(Concluded from previous issues)

ARNEL/COTTON

The 60/40 Arnel/cotton blend and Arnel and cotton combinations are being used in knit shirt, blouse and dress, thermal knit and sleepwear fabrics. These fabrics can be piece dyed by a simple one-bath procedure into a complete color line of reserves, cross dyes and union shades. Selected disperse and azoic developed dyes are used for the Arnel. Aftertreated direct and developed dyes are used on the cotton.

Piece goods are dyed on conventional enclosed dye winches. The fabrics should be given an alkaline scour with an anionic detergent and TSPP to remove waxes and pectins present in the cotton and to remove any soilage. For pastels and bright shades, a light bleach is usually required to clean up the cotton and remove motes. Since Arnel is quite resistant to saponification, a buffered peroxide bleach bath has been developed which will not saponify the Arnel. The following buffered bleach bath is used.

10.0% (owf) hydrogen peroxide (50%)
5.0 (owf) Borax
5.0% (owf) TSPP
2.0% (owf) of a crypto anionic such as Sandopan DTC
Run 45 minutes at 175-180°F (pH 9.5)

Fabrics which are to be finished white can be bleached by conventional cotton bleaching procedures on the winch using sodium peroxide or hydrogen peroxide and sodium silicate. Any saponification which may occur under these conditions will be negligible and not affect fabric properties. Kier boiling and kier bleaching of Arnel/cotton knit fabrics is not recommended because these conditions are too severe and will cause excess saponification.

Where a fluorescent white is desired, the fabric is scoured and given either a peroxide or Textone (sodium chlorite) bleach. The optical brightener for the cotton is applied in a new bath. A typical procedure for a fluorescent white shade is:

1) Scour
2) Bleach with 5% Textone, 5% Depco Bleach Assist, 3% oxalic acid, and 0.6% Uvitex ERN for one hour at 205-208°F. Rinse well.
3) In a new bath, tint cotton with 0.3% Tinopal 3BSA and 10% Glauber's salt for 30 minutes at 140°F.

Reserve effect shades are most economically made by dyeing the cotton with selected direct dyes and reserving the Arnel. The reactive-type cotton dyes such as the Procions and Cibacrons can be applied by exhaust methods on a winch to Arnel/cotton knits. Arnel's slow saponification rate as compared with secondary acetate (9) enables good reserves to be obtained on the Arnel even though the Procions and Cibacrons are applied under strongly alkaline conditions to the cotton. Excellent fastness properties are obtained with these reactive dyes.

Reserve effects can also be made by dyeing the Arnel and reserving the cotton; however, care in selection of disperse dyes and dispersing agents is required (6) since disperse dye stains on cotton will lower the lightfastness rating. The use of high leveling action detergents, such as Parapon AP, decreases the staining of disperse dyes on cotton. A light scour with 2.5% sodium oleate soap flakes and 2.5% sodium hydrosulfite for 30 minutes at 120°F will help remove residual disperse dye stains on cotton.

Union and cross dye shades on Arnel/cotton knit fabrics are usually dyed by a one-bath procedure using selected disperse dyes such as those in Table VIII (Part II) and selected aftertreated direct dyes. Over 100 commercially available direct dyes for cotton were screened for their staining and fastness properties on Arnel/cotton fabrics. Table XII lists some of the better direct dyes for Arnel/cotton fabrics. Developed colors are used for specific heavy shades. To give "O" fading resistance, 0.25% of an inhibitor is used in all dyeing containing blue disperse dyes. A larger amount of inhibitor is required when nongas-fast disperse blues are used.

Carriers can be used when dyeing the Arnel in heavy shades on this blend. Carrier which gives too fast a strike of disperse dyes onto the Arnel will cause problems of overdyed creases. Of the carriers evaluated, Marnel 82, a butyl benzoate type, has given good results. For heavy shades, 0:5 g/l of Marnel 82 is added to the dyebath prior to adding the dyes.

A typical procedure for piece dyeing Arnel/cotton knits is given in Table XIII.

*See February 8, 1960 issue for Part I; February 22, 1960 issue for Part II.

TABLE XII

Selected direct dyes for cotton on Arnel/cotton blends

Yellows:
Superlitefast Yellow EFC
CI Direct Yellow 39
Lumicrease Yellow 3LG
Superlitefast Orange LLLWF
Lumicrease Orange 3LG

Reds:
CI Direct Red 89
Superlitefast Brilliant Scarlet WYLC
Superlitefast Rubine WLKS
CI Direct Red 83
CI Direct Red 79

Browns:
Cuprophenyl Brown RL
CI Direct Red 84

Blues:
Superlitefast Brilliant Blue 16BLL
Superlitefast Brilliant Blue 12BLL
Fastolite Brilliant Blue L
CI Direct Blue 76
Calcodur Resin Fast Blue 2G
Sunfast Blue BRN
CI Direct Blue 98
Superlitefast Blue 8GLN
CI Direct Blue 86
Solophenyl Blue ABL

Greys and Blacks:
CI Direct Black 63
CI Direct Black 91
Cuprofix Black OB
CI Direct Black 22

Developed Dyes:
Diazamine Fast Scarlet 3GWL
CI Direct Red 155
CI Direct Black 80

TABLE XIII

Dyeing procedure for Arnel/cotton knits

1) Load goods on enclosed winch.
2) Scour 30 minutes at 160°F 2.0% Parapon AP and 2.0% TSPP. Rinse.
3) Set bath at 110°F with 2.0% Parapon AP, 0.1% Sequestrene NA4 (a tetrasodium salt of EDTA), and 0.25% Conco Inhibitor FR (a blend of high-boiling amines and emulsifier).
4) Add dissolved direct dyes and dispersed dyes. Run five minutes.
5) Raise the temperature to 205°F-212°F over 30 minutes. Run 15-20 minutes at boil.
6) Shut off steam and add salt in three or four portions.
7) Run at boil 30-90 minutes, depending upon depth of shade, before sampling.
8) When on shade, cool bath to 160°F by running in warm water. Add salt when rinsing in a new bath.
9) Aftertreat with fixative for cotton. Rinse.
10) For heavy shades on Arnel, scour 20 minutes at 130°F with 1.0% of a nonionic surfactant such as Alkanol HCS and 1.0% TSPP to remove surface dye.

TABLE XIV

Developed union black procedure for Arnel/cotton

1) Scour and rinse.
2) Mix 2.5% CI Azoic Coupling Component 18 with 5.0% ethyl alcohol (Solox). Dissolve 0.65% caustic soda with 2.5% water. Stir the dissolved caustic into the naphthol mixture. Let solution stand for five minutes. Dilute with hot water. The solution should be a clear, greenish-yellow liquid.
3) Strain the naphthol solution into a new dyebath. Run five to 10 minutes. Add 3.0% acetic acid (56%) diluted with water to the dyebath (pH 5.0-5.5). A fine milky precipitate is formed. Run 10 minutes.
4) Mix 4.0% Latyl Diazo Black B with 2.0% Igepon T. Dissolve and dilute with hot water. Strain dissolved dye into the dyebath. A purplish brown color results.
5) Dissolve and add 3.0% CI Direct Black 80 to the dyebath.
6) Raise to a boil. Slowly add 20% salt to the bath. Run 90 minutes at boil.
7) Cool bath by filling with warm water. Salt rinse in new baths.
8) Diazotize in a new bath for 60 minutes at 75°F with 6% sodium nitrite and 12% sulfuric acid (conc). Rinse thoroughly with cold water.
9) Develop cotton dye with 2.0% CI Developer 14 and 2.0% soda ash. Run 20 minutes at 75°F. Rinse well.
10) Complete development of Arnel dye by running in a new bath with 2.0% sodium acetate and 1.0% Igepon T. Raise to 190°F over 30 minutes. Run 30 minutes at 195°F. Rinse.
11) Scour with 3.0% soap flakes and 1.5% soda ash. Run 30 minutes at 180°F. Rinse well.

Pastel and light shades which are to be resin finished are usually taken off of the dye winch from a salt rinse. Other shades are aftertreated with 0.5-3.0% of a cationic resin fixative, such as Dyefix C, Sandofix WE, or Polyanthrene KS, in order to improve the washfastness level of the direct cotton dyes.

Arnel can be dyed a developed black which reserves the cotton by using 3.0% Eastman Diazo Navy Blue RB, diazotizing cold, neutralizing with sulfamic acid, and devoloping the shade with 0.5% Developer G Supra (phloroglucinol). If a union shade is desired, the cotton can be subsequently dyed with CI Direct Black 91 and aftertreated with copper sulfate. CI Direct Black 91 will dye cotton black and reserve the Arnel.

A developed union black can be dyed on both fibers simultaneously by co-dyeing with 4.0% Latyl Diazo Black B, 2.5% CI Azoic Coupling Component 18, and 3.0% CI Direct Black 80. The fabric is diazotized cold. The cotton shade is developed cold in a new bath with 2.0% meta toluylene diamine (CI Developer 14) and 2.0% soda ash. The shade on the Arnel is subsequently developed in a new bath at 190°F with 2.0% sodium acetate and 1.0% Igepon T. Table XIV outlines this procedure in detail.

When necessary, Arnel/cotton knit can be rehandled without difficulty. Fabrics which have been aftertreated with a cationic resin fixative or resin finished should be given a phosphoric acid strip to remove the resin prior to redyeing. Both direct and disperse dyes can be partially stripped by scouring the fabric with 5% Tamol N and 1% TSPP for an hour at a boil. A Textone and oxalic acid bleach is used for a more severe stripping action when a clean fabric base is required for redyeing.

Arnel/cotton jersey is being roller printed with resin-bonded pigment colors.

Fastness levels for Arnel/cotton knits dyed by these procedures will be #2 AATCC washfastness, 20-40 hours Fade-Ometer lightfastness and good crock, perspiration, gas and "O"-fading fastness.

FINISHING —— Arnel/cotton knit fabrics can be finished on conventional knit-goods finishing equipment. Drying temperatures of 250-300°F are normally used; however, Arnel will stand higher temperatures such as may be used for resin curing of cotton fabrics.

In thermal knits, underwear, and sleepwear applications where resin finishing is not too desirable, the Arnel/cotton blend is particularly applicable because of the inherently softer hand and improved dimensional stability over nonresin-finished 100%-cotton fabrics. For these applications, the Arnel/cotton fabric is usually finished with 1.0-3.0% of a cationic softener in the final rinse bath. Anticurl finishes which contain a filler and a softener can be padded on.

Arnel does not have any reactive sites which will cross link with resins; however, where modifications to the hand and stabilization of the cotton are desired, resin finishing can be used. Monomeric UF and acetal resin finishes commonly used for resin finishing 100% cotton knits have been found satisfactory on the blend. The cyclic ethylene urea resins are not recommended since they have a deleterious effect upon the lightfastness of cotton dyed with direct dyes.

Development work has shown that the modified heterocyclic melamine resins cured with the fast-curing catalysts, such as a combination of zinc nitrate and an amine hydrochloride, give good results on this blend.

To improve the sewability of filament Arnel/cotton combinations, the resin formulation show in Table XV was developed. Excess surface deposition of resin on the filament Arnel tends to make it stiff and subject to needle cutting. This problem is overcome by reducing the resin solids pick up and by use of silicone and polyethylene emulsions for more lubricity to the yarns.

When resin finishing, spreader settings at the pad should be wide enough to overspread the fabric width two or three inches over the desired finished width. This is to allow for the normal widthwise contraction during drying so that the fabric is cured at the desired finished width.

Arnel/cotton tubular knit fabrics are calendered on either regular or conventional steam calenders. Calendering is normally performed with minimum calender roll pressure and full steam.

TABLE XV

Resin finishing filament Arnel/cotton knit fabrics

50/50 Filament Arnel/cotton combination

1) Pad dry (75% pick up) with
   60 g/l Aerotex Resin 23 Special (triazine)
   12 g/l Accelerator MX
   2 g/l Aerotex Buffer DCY (organic nitrogen-containing compound)
   30 g/l Syl-mer 54 (40% silicone emulsion)
   30 g/l Moropol 700 (nitrogen-free nonionic polyethylene emulsion)
2) Dry at 220°F.
3) Cure at 300°F for two and one-half minutes.

SUMMARY

Arnel in blends offers both functional and economic advantages in circular knit applications because of its dimensional stability, pill resistance, color-styling potential, and ease-of-care properties.

A one-bath procedure for dyeing 50/50 Arnel/Orlon blends has been developed. Neutral-dyeing cationic dyes are used for the Orlon and disperse dyes are used for the Arnel. The dyes are applied simultaneously at a pH of 6.0-7.5. A selected anionic surfactant, Igepon T, is used in the bath to promote dye compatibility, retard the strike of cationic dyes onto the Orlon, and maintain a good dispersion of the disperse dyes. It is postulated that the mechanism of the anionic surfactant cationic dye system is one in which a loosely held surfactant-cationic dye compound is formed. With selected surfactants a stable dye system is obtained. During the dyeing process, as the concentration of the dye cations decrease, the compound dissociates and makes available additional dye cations for the Orlon.

Practical procedures for dyeing reserve, cross dye and union shades on Arnel/Orlon have been given. A range of cationic and disperse dyes has been evaluated and recommended for use on this blend. Arnel/Orlon jersey lends itself to printing and durable pleating. Finishing procedures for this blend are similar to those used on 100% acrylic or 80/20 acrylic/wool jersey. Cationic softeners are normally used.

Principles used in dyeing Arnel/Acrilan blends have been reviewed. Most union shades are easily obtained with disperse dyes only. Some heavy union shades will require filling in the Acrilan with cationic dyes. Reserve effects are obtained by dyeing the Acrilan with cationic, acid or premetallized acid dyes and reserving the Arnel. Cross-dyed effects are limited because both Arnel and Acrilan are dyed with disperse dyes.

Arnel/cotton knit fabrics can be dyed a complete range of shades by a simple one-bath procedure using disperse dyes for the Arnel and after-treated direct dyes for the cotton. An extensive range of direct dyes have been screened and those which have the best fastness and staining properties on this blend have been recommended. Union blacks are dyed with developed dyes. For many applications, Arnel affords sufficient dimensional stability so that only a cationic softener or a nonresin anti-curl finish is adequate. Arnel has no reactive sites for cross linking with resins; however, resin finishing can be used to modify the hand and stabilize the cotton. Monomeric UF resins, reactive acetal resins, and modified heterocyclic melamine resins can be used on Arnel/cotton knit fabrics.

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TRADEMARKS

Geigy Dyestuffs
Maxilon, Setacyl, Cuprophenyl, Sequestrene
General Aniline and Film Corp
Genacryl, Celliton, Genacron, Igepon
E I duPont de Nemours & Co, Inc
Orlon, Sevron, Latyl, Avitex, Alkanol, Methacrol
Interchemical Corp
Interchem
Sandoz, Inc
Sandopan, Ceranine, Foron, Sandofix, Lumicrease, Cuprofix, Diazamine
Eastman Chemical Products, Inc
Eastone, Eastman
Koppers Co, Inc
Lenra
Chemstrand Corp
Acrilan
Celanese Corp of America
Arnel
Ciba Co, Inc
Deorlene, Cibacete, Uvitex, Cibacron
Olin Mathieson Chemical Corp
Textone
E F Houghton & Co
Softex
Quaker Chemical Products Corp
Velvetol
Onyx Oil & Chemical Co
Aston
Kelco Co
Keltex
Rohm & Haas Co
Tamol
Arkansas Co, Inc
Parapon
Verona Dyestuffs
Astrazon
Putnam Chemical Corp
Basacryl
Depaul Chemical Co
Depco
Sou-Tex Chemical Co
Dyefix
Althouse Chemical Co, Inc
Superlitefast, Fastolite, Polyanthrene
American Cyanamid Co
Calcodur, Aerotex
B & H Color Chemical Co
Sunfast
Continental Chemical Co
Conco
Allied Chemical Corp
Diazine
Dow Corning Corp
Syl-mer
Moretex Chemical Products, Inc
Moropol
Arnold Hoffman & Co, Inc
Procion
Marwin Dyestuff Co
Marnel

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38th National Convention———

RECENT ADVANCES IN THE TECHNOLOGY OF DYEING BLENDS CONTAINING DACRON POLYESTER FIBER*

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Recent progress in dyeing fabrics of Dacron blended with wool, rayon, cotton, Orlon, Acrilan, and Arnel is discussed. Particular emphasis is placed on blends of Dacron with wool for men's and women's wear in which the Dacron is dyed with disperse or cationic colors and the wool with acid, premetalized acid, or chrome dyes.

The effect of heat setting prior to dyeing on the absorption of disperse and cationic dyes by Dacron is an important consideration especially in the production of lightweight tropical suiting fabrics which tend to crease in beck dyeing. Data are presented to show the effect on dyeability after heat setting at temperatures in the range of 280°F to 400°F. The present work includes the effect of heat setting on the dyeability of staple fibers of Type 54 Dacron and the new modified Type 64 Dacron. Previously such data were available only for filament Dacron.

Carrier dyeing of blends containing Dacron also is discussed in relation to the acid-modified Type 64 Dacron with disperse and cationic dyes.

The effects of dyeing time, dye selection and rates of dyeing on staining of the other components of blends and the resulting effect on fastness to solvent bleeding are emphasized.

INTRODUCTION

THE growth and popularity of blend fabrics containing Dacron polyester fiber have been phenomenal during the past six years. In summerweight suiting fabrics for men and women, for example, blends of Dacron and wool, Dacron and Orlon acrylic fiber, Dacron and rayon, and Dacron and cotton have dominated the market for several seasons. It is not difficult to understand the reasons for this. In a word Dacron has supplied the demand for "superlightweight" fabrics which give maximum comfort and durability, as well as a tailored appearance, to summer garments. This is especially true of Dacron and wool blends, sales of which far exceed those of other tropical-suiting materials.

DACRON TYPE 54 AND DACRON TYPE 64

In 1958 the Du Pont Company introduced Dacron Type 64, which combines improved pill resistance and affinity for cationic as well as disperse dyes. This development has paved the way for the use of Dacron in fall, winter and year-round suitings in blends of worsted woven fabrics that exhibit a soft hand, excellent drape and cover. Dacron Type 54 staple and tow will continue to be produced and are recommended for blends of Dacron and cotton where the new Dacron Type 64 is at present unsuitable, or for other uses where there is no particular advantage of Dacron Type 64 over Dacron Type 54.

The fact that Dacron Type 64 has good affinity for cationic as well as disperse dyes so far has had very little impact on the dyeing and finishing industry. Nevertheless, there are potentially several advantages in favor of this fiber over Dacron Type 54.

The use of selected cationic dyes in heavy shades, such as navy and black, will result in lower dye costs and better fastness to solvent bleeding, sublimation and hot-wetfastness properties. In addition, the outstanding brilliance of cationic dyes will enable the dyer to obtain for the first time certain bright shades for ladies' wear.

*Presented by P L Meunier on October 8, 1959 during the 38th National Convention, Washington, DC

PIECE DYEING OF BLENDS

BLENDS OF DACRON AND WOOL———Whether Dacron Type 54 or the new Dacron Type 64 is used, the blend levels are approximately the same; ie, from 55% to 70% Dacron and from 45% to 30% wool. Almost all blend fabrics of this type are dyed in piece form, usually in union shades. Optimum results are dependent on three factors: dye selection, carrier selection, if required, and dyeing technique or procedure.

The disperse dyes are used extensively for dyeing the Dacron in blends with wool. These dyes do not actually dye wool but many of them stain wool noticeably. Excessive staining can lead to unsatisfactory fastness properties. Factors affecting the degree of stain are:

1) Dye selection
2) Dyeing rate and time of dyeing
3) Temperature of dyeing
4) Carrier selection.

1) *Dye Selection.* A wide range of disperse dyes is now available. Obviously dyes should be selected that transfer substantially from the wool to Dacron, especially when heavy shades are applied. Through intensive research, the Du Pont line of Latyl dyes has been continually improved and new additions to the line are affording improved results at lower costs. For example, the new Latyl Blues 2R, LS and BCN are providing low-cost blues for use in heavy charcoal, brown, navy and black shades by minimizing the need for Latyl Brilliant Blue BG and 2G, which show a greener shade change in incandescent light. Also, the new dyes have improved fastness to solvent bleeding and stain wool no greater than dyes previously used in commercial practice.

2) *Dyeing Rate and Time of Dyeing.* Dacron is dyed by disperse colors by a solution or "partition coefficient" mechanism (*1*). Disperse dye solid particles are broken down gradually into molecules which move through the bath to the surface of Dacron and diffuse into the fiber. It is believed that hydrogen-bonding forces between the dye and the fiber may be involved.

The dyeing process proceeds slowly at 180° to 212°F in water. It is accelerated considerably by the use of a carrier or by an increase in the temperature; eg, up to 250°F. In either case, the acceleration is about five-fold.

With blends of Dacron and wool, it is important to remember that the wool takes up the disperse dyes rapidly and is heavily stained in the first stage of dyeing. Therefore, time must be given to allow the disperse dyes to transfer to the Dacron. If this

is not done, an excess of disperse dye will have been used in bringing the Dacron to shade and the wool will remain heavily stained.

A comparison of two opposing techniques was easily demonstrated in the laboratory. Heavy navy shades were dyed on 55/45 Dacron Type 54 and wool suiting fabric and a comparison was made of crocking and solvent-bleeding (perchlorethylene) properties. In one case, a "controlled" dyeing was made in which sufficient time (two hours) was allowed at the boil to dye the Dacron in the presence of ortho-phenylphenol carrier; the fabric was then scoured and the wool dyed with Chromacyl premetallized dyes. The fastness to crocking was excellent and there was a barely perceptible ring formed in the Perclene perchlorethylene - solvent bleeding test. In the other case, a dyeing was made under similar conditions except that 40% more disperse dye was required with 20% less carrier in the bath. Fastness to wet and dry crocking was poor and heavy bleeding occurred in the Perclene test. This is attributed to heavy wool staining. It is believed that this simulates some conditions encountered in the trade where heavy wool staining and poor fastness are caused by any one or a combination of the following:

Lower temperature of dyeing
Loss of volatile carrier through distillation
Inadequate time of dyeing including time of dyeing-on of adds
Excessive amounts of disperse dye.

Dacron Type 64 will afford some relief in this direction since the dyeing rate of disperse colors on this fiber is appreciably faster than on Dacron Type 54. It has been observed that less difficulty with solvent bleeding is experienced in commercial dyeing on blends of Dacron Type 64 and wool.

Deep shades dyed with cationic dyes have excellent solvent-bleeding sublimation and wetfastness properties. Cationic dyes are not soluble in the solvent cleaners and their stain on wool is easily removed. This has been shown in comparative laboratory dyeings on heavy navy shades made with both cationic and disperse dyes. There was no solvent staining by the cationic dyes and this dyeing also had excellent fastness to hot pressing, sublimation, perspiration and even to an AATCC #3A Wash Test.

As a means of illustrating the ease with which cationic dye stain could be removed from wool, a fabric of 55/45 Dacron Type 64 and wool was dyed first with cationic dyes to a black shade on the Dacron. The formulation consisted of Sevron Yellow R (CI Basic Yellow 11), Sevron Blue 5G (CI Basic Blue 4), also Du Pont Brilliant Green Crystals (CI Basic Green 1) and Du Pont Fuchsine (CI Basic Violet 14). Although the wool was undyed, it was heavily stained by the Fuchsine. A mock cross-dyeing of one hour with 4% (owf) formic acid removed the stain completely. Likewise, a mock chroming treatment with 2% chrome and 5% glacial acetic acid for one-half hour removed the stain. These observations explain why the solvent-bleeding fastness and even the washing fastness of union shades or cross-dyes on Dacron Type 64 and wool are so outstanding.

3) *Temperature of Dyeing.* The importance of an adequately high temperature in piece dyeing cannot be stressed too often or too strongly. Many examples of faulty dyeings have been attributed to nonuniform and insufficient application of heat in dyebecks. For successful dyeing, temperatures in the range of 205° to 212°F are essential, preferably in the higher region, 208° to 212°F. Overhead live steam should be available especially in large machines, and closed steam coils should be installed in the rear to assure uniform temperatures. Also, good circulation of the dye liquor is important to avoid shading across the machine. Some plants have resorted to the use of heat exchangers and pumps mounted outside of the dye beck to achieve better results.

Optimum wetfastness, however, is realized through the use of still higher temperatures in pressurized equipment. This is now established in piece dyeing suiting fabrics on beam machines (*2*). Generally, the temperature is limited to 240°F because of the wool content of the blends; sometimes a small amount of carrier is used to increase the rate of dyeing.

4) *Carrier Selection.* Ortho-phenylphenol is the most widely used carrier for use in dyeing blends of Dacron and wool. The sodium salt of ortho-phenylphenol is available under the name Dowicide A. Since the sodium salt has no carrier activity it is acidified in the dybath with acetic acid or diammonium phosphate. Proprietary carriers containing the free ortho-phenylphenol are also used and some mills prepare their own specific emulsions with this carrier.

Ortho-phenylphenol has good value and is economical to use. However, unless it is removed as completely as possible from the dyed Dacron, it exerts a degrading effect on the lightfastness of several disperse dyes. Since the most efficient scour does not remove enough of the carrier, a heat treatment to sublime the remainder is desirable. Satisfactory lightfastness is obtainable, however, by selecting dyes on which the carrier has little or no adverse effect.

Chlorobenzenes and aromatic esters are also offered for carrier dyeing, but their use has been limited essentially to dyeing in closed circulating equipment. The chlorobenzenes must be handled carefully because of their toxicity and the volatility of both types may be a cause for carrier spotting. Neither type affects lightfastness.

Latyl Carrier A is a nonvolatile, nonspotting, dispersible solid that does not reduce lightfastness appreciably. Its use is limited only because of high cost in relation to other carriers.

Carrier selection is also important where wool staining is concerned since the carrier should remain in the bath throughout the dyeing to promote transfer of disperse dyes to the Dacron.

BLENDS OF DACRON AND COTTON OR RAYON——Piece dyeing blends of Dacron and cotton or rayon follows much the same pattern as that for Dacron and wool except for the choice of direct or vat dyes for the cellulosic fiber and the use of disperse-developed colors for the Dacron. A major difference does exist, however, in that the Du Pont Thermosol continuous dyeing process is now commerically used for blends of Dacron and cellulosic fibers (*3*).

Dacron Type 54 is used in blends with cotton. Type 64 is not recommended at the present time for blends with cotton although it is being used in blends with rayon.

Piece dyeing of these fabrics in the beck, jig, beam (*2*) and Pad-Roll (*4*) machines is well known. Except for the facts that both Dacron and rayon and Dacron and cotton are often resin-aftertreated and the cellulosic fiber may be dyed with direct, sulfur, or vat dyes depending on the end use, there are no problems peculiar to these blends. However, cationic dyes will be useful on blends of Dacron Type 64 and rayon fabrics because of their economy and good wetfastness properties in heavy shades.

Disperse-developed dyes are applicable to these blends because the

cellulosic fibers are not degraded by the diazotization reaction. Economical black and certain navy, maroon and red shades can be obtained. The cellulosic fiber is stained a light tan which is covered as the rayon or cotton is dyed to a union shade.

BLENDS OF DACRON AND ORLON ACRYLIC FIBER———A 50/50 blend of Dacron Type 54 and Orlon Type 42 is a very popular suiting fabric. Research on the dyeing process resulted in the one-bath method announced in 1958 (5). To avoid complex salt formation, between cationic dyes and the carrier, Latyl Carrier A, which is nonionic, is used. The disperse dyes are added first and, at 180°F, the cationic dyes are added. Dyeing is carried out at the boil for two hours. Excellent dyeings with outstanding fastness properties have been produced.

Heavy shades for the Orlon Type 42 in this type blend invariably include CI Basic Green 4 or CI Basic Green 1. Both of these dyes stain Dacron a trace to noticeably but when dyebath conditions are not ideal, this stain can be considerable. It can, however, be cleared easily by a treatment with:

5.0% sodium hypochlorite solution (5.25% ai)
1.0% glacial acetic acid
½ hour at 120°F.
Rinse and treat with
2.0% sodium bisulfite
10 minutes at 70° to 80°F.
Rinse and dry.

Laucius et al (6) have described how the two cationic green dyes revert to the colorless state when any loose surface color is exposed to alkali. This colorless form is converted to the green color by heat or by a combination of acid and heat.

This behavior explains some commercial experiences where an apparently clean dyeing of Orlon with undyed Dacron as an effect develops a green stain on the Dacron during heat-setting or other finishing operation involving heat. This means that the dyeing was probably finished on the alkaline side and absorption of the green cationic dye was not as efficient as it should have been. Usually, an analysis of the situation shows that insufficient acid was used in the dyebath and the pH drifted too high, causing poor exhaustion and penetration of the green. A pH of 4 to 5 is recommended for deep shades on Orlon in such blends.

Dacron Type 64 is not at the present time recommended for blends with Orlon since cationic dyes are absorbed by both fibers making it difficult to control shades in union dyeing.

TABLE I
Sodium sulfate concentration recommended for use in dyeing Dacron Type 64

Disperse or Cationic Dyes
g/l Anhydrous Sodium Sulfate

	212°F (pH 4.0-8.0)	250°F (pH 4.0-6.0)
Original Dyeing	0	6
Redyeing	3	6

Developed Black
g/l Anhydrous Sodium Sulfate

	212°F			250°F	
	Base	Developer	Diazo	Base & Developer	Diazo
Original Dyeing	0	6	6	6	6
Redyeing	3	6	6	6	6

BLENDS FROM DYED FIBERS AND YARNS

Dacron in the form of staple, top and tow in yarns blended with wool, cellulosic and other fibers is dyed and subsequently used in the production of fabrics in solid shades, heathers or fancy patterns and effects. In the case of fancy pattern work it is usually desirable to cross-dye fabrics containing black, navy or heavy brown warp yarns of Dacron and wool and undyed Dacron and wool yarns in the filling. When cross-dyeing with a carrier at the boil, excessive bleeding occurs from the dyed Dacron and staining of white wool results.

Despite extensive attempts to find a solution, this remains an unsolved problem. Dacron dyed with a developed black or direct-dyeing disperse colors bleeds just enough in the carrier bath to cause the undesirable staining. The amount of stain appears to be dependent somewhat upon the carrier used; Latyl Carrier A gives less stain the Dewicide A, but even this improvement is not enough.

Dyed rawstock, top and tow of Dacron and yarns of Dacron and wool are used in producing suiting fabrics on the worsted spinning system. The dyeing of rawstock is carried out in most cases in pressurized circulating machines at high temperatures, up to 250°F, and, to a minor extent, at 208° to 212°F in machines operated at atmospheric pressure. The same is true of tops and yarns. Tops of Dacron are dyed in Abbott, Fredericks or Obermaier machines with a carrier at the boil or in Abbott machines at high temperatures under pressure without carrier. The top ball must have uniform density, allowing for 3 to 5% shrinkage, depending on dyeing temperature, and must be wound firmly to prevent channeling or blow-outs.

The advantages of dyeing Dacron in the form of tow are important to the processor of blends. By dyeing at the tow stage he realizes economies over stock dyeing since carding and possibly combing operations required for manufacturing worsted-type fabrics may be eliminated. Wool or rayon can be blended with the Dacron as the tow is processed through the Pacific Converter.

Dacron in the form of tow is dyed mostly by the high-temperature method in pressurized stock-dyeing machines equipped with perforated baskets. Tow is "piddled" into the basket from the carton, utilizing curved bar creels to open the tow and to enable it to be handled without tangling. Recently, a valuable improvement in dyeing technique was introduced (7). This is the Du Pont Pad-Fix Method for dyeing Dacron tow with disperse and developed-disperse dyes. It consists of padding the tow with a dye dispersion, placing the tow in a perforated basket and then placing the basket in a stock dyeing machine, adding water, heating to dyeing temperature and continuing dyeing in the usual manner. Essentially, the new method introduces a padding operation in place of a wet-out treatment. In addition to improved levelness, the dyeing time is reduced and better uniformity is obtained from lot to lot.

In the dyeing of Dacron Type 64, anhydrous sodium sulfate is sometimes added to dyebaths to avoid possible hydrolysis of the fiber. Experience in mill runs has shown that it is possible to be quite specific about the concentrations of sodium sulfate required for safe operation. At 250°F, with cationic or disperse dyes, 6.0 g/l of anhydrous sodium sulfate must be added to the dyebath, but none is required when dyeing at the boil with a carrier. However, it is advisable to use 3.0 g/l in redyeing operations.

Cationic dyes can be applied to Dacron Type 64 either at the boil with carrier or at 250°F without carrier. Latyl Carrier A can be used over the

full range of shades since it is nonionic and does not form complexes with cationic dyes. On the other hand, with ortho-phenylphenol which is anionic, complexes can be formed, especially in the production of deep shades. Ortho-phenylphenol is not recommended for use with cationic dyes in equipment having a short bath-to-fiber ratio because of the danger of precipitating the cationic dye with the anionic carrier.

Yarns made of blends of Dacron and rayon or Corval can be dyed by a one-bath, two-step procedure. The disperse dyes are first applied at the boil with a carrier. After dyeing for one and one-half to two hours the direct dyes and common salt are added and the bath is allowed to cool to the desired temperature for exhaustion of the direct dyes.

Dyeing blends of Dacron and wool yarn has been practiced for several years but there have been certain limitations on the depth of shade obtainable with suitable fastness properties. Light and medium shades are quite satisfactory when dyed either at the boil with carrier or at high temperatures. In the latter case, a small amount (2.5 g/l) of carrier is usually required because the temperature is limited to 225°F to protect the wool. However, 3 g/l formaldehyde in the dyebath gives enough protection to the wool to allow dyeing temperatures up to 240°F. Whenever such high temperatures are employed, it is advisable to evaluate finished fabrics by wear tests before proceeding to full production.

With disperse dyes and deep shades applied at the boil, 7.5 g/l of Dowicide A is recommended and a scour with a nonionic surfactant such as Alkanol HCS surface-active agent, ammonia, concentrated $Na_2S_2O_4$ and cetyl betaine should be given after the Dacron is dyed so that the disperse dye stain from the wool can be cleared as much as possible. Chrome dyes are then applied to the wool in the usual manner. Light shades on the wool are obtained with neutral-dyeing premetalized acid dyes.

EFFECT OF PREHEAT SETTING ON DYEABILITY

Dacron has the important property of being set or formed by heat. Heat setting causes a rearrangement and fixation of the internal structure of individual fibers so that they assume permanently the structural arrangement in which they are held during heat setting. Advantage is taken of this property in stabilizing yarns, removing residual shrinkage, increasing wrinkle resistance and obtaining durable pleats. When a set is imparted to Dacron, its effect is overcome only by subjecting the fiber to setting conditions more severe than those originally applied.

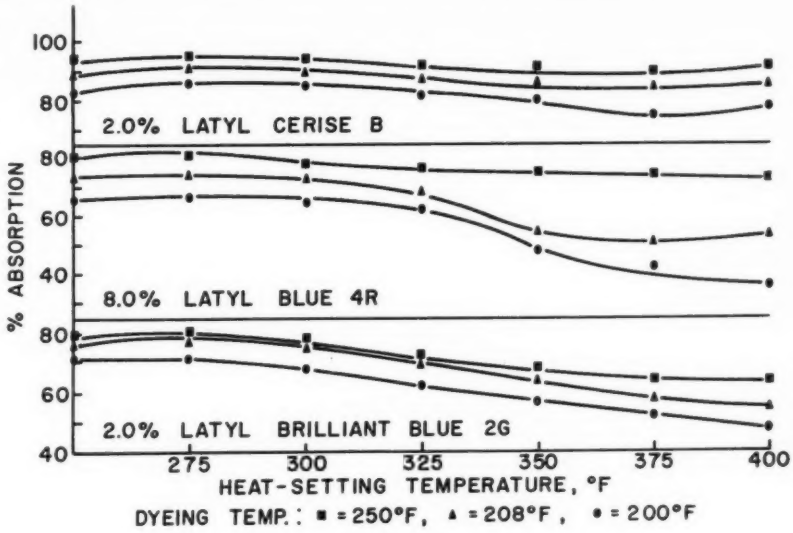

Figure 1

Effect of heat-setting temperature on absorption of disperse dyes by Dacron Type 64 polyester fiber

Heat setting of piece goods before dyeing is sometimes required to avoid wrinkles, creases, scrimps and other imperfections which might be set into goods during dyeing. In practice, blends of Dacron and wool are stabilized sufficiently by crabbing at the boil; some times a dry heat-set at higher temperature is desired. Blends of Dacron and celluloses are heat set before bleaching at about 385°F. Conditions of heat setting will vary, depending on specific objectives in each textile mill.

The dyeability of filament yarn made of Dacron Type 56 is affected by variations in heat setting (*8*). The effect of heat setting on the dyeability of Dacron Type 64 was studied to provide the dyer with knowledge of the behavior of disperse dyes and thereby show what effects on levelness might be expected if heatsetting is nonuniform.

Dacron Type 64 tow was heat treated as six different temperatures ranging from 275°F to 400°F and then dyed with three typical disperse dyes each applied at 200°F and 208°F with Dowicide A and at 250°F without carrier. The amount of absorbed dye was determined by spectrophotometric analysis of solutions of the dyed fibers in an appropriate solvent.

Figure 1 shows the gradual decrease in dyeability as the temperature of heat setting is increased. This is particularly pronounced in the case of Latyl Blue 4R when dyed under atmospheric conditions (loss of 32% on fiber heat set at 375°F, dyed at 208°F). On the other hand dyeability with Latyl Cerise B is affected much less (7% loss on fiber heat set at 350° -375°F). Latyl Brilliant Blue 2G exhibits a gradual loss at all dyeing temperatures, in the range of 16 to 24%. In every case, however, dyeing at 250°F shows little effect of the heat setting. (Blue 4R—9%, Blue 2G —19% and Cerise B—4%).

Three conclusions are drawn from these data:

1) Dyes vary in their behavior.
2) Preheat setting has least effect on dyeings made at 250°F. It will be recalled that Thermosol dyeing also are affected little by preheat setting (*9*).
3) Selection of heat-setting temperatures under 350°F is desirable to avoid serious losses in dyeability. In view of the variation in the effect on individual dyes, heat setting should be uniform across the goods and at the lowest possible temperature commensurate with fabric stability requirements.

TABLE II

Disperse dyes recommended for medium and heavy shades on Dacron polyester fiber

	Shades	
	Medium	*Heavy*
CI Disperse Yellow (Pr 625)	X	
CI Disperse Yellow 23	X	X
CI Disperse Red 1		X
CI Disperse Red 13		X
CI Disperse Blue 9		X
CI Disperse Blue 27	X	X
Latyl Yellow 3G	X	
" Yellow RC	X	
" Orange NST	X	X
" Scarlet FSW	X	
" Red GFS	X	
" Cerise B	X	
" Cerise N	X	
" Violet BN	X	X
" Blue 2R	X	X
" Blue 4R	X	X
" Blue LS	X	X
" Blue BCN	X	X
" Brilliant Blue BG	X	

TABLE III

Cationic dyes recommended for use on Dacron Type 64

CI Basic Yellow 11
CI Basic Yellow 13
CI Basic Green 1*
CI Basic Green 4*
CI Basic Violet 14*
Sevron Yellow GL*
" Yellow 3RL*
" Orange CL*
" Brown YL*
" Red GL*
" Bordeaux G*
" Blue BGL
" Blue 5G*
Cationic Red TLX-423*
" Red TLX-424*

*Good thermal stability; recommended for high-temperature dyeing.

TABLE IV

Comparative dye costs for heavy shades on Dacron Type 64

	Percent dye on weight of fiber	
	Navy	*Black*
CI Basic Yellow 11	1.0	2.8
CI Basic Violet 14	0.4	0.5
CI Basic Green 1	0.5	0.8
CI Basic Blue 4	1.1	0.25
Dye cost per 100 lbs of fiber	$12.70	$17.81

DYE SELECTION FOR DACRON IN BLENDS

A comprehensive treatment of this subject, dyes for Dacron Types 54 and 64, was given in a paper presented before this Association in 1958 (*10*). It is the purpose of this paper to supplement that information with data on new products.

DISPERSE DYES FOR DACRON TYPE 54 AND TYPE 64———

1) *Leveling Action—Light Shades.* Since unlevel deposition of dye is particularly evident in light shades, special attention must be given to the selection of dyes which are absorbed slowly or which transfer. Celanthrene Fast Yellow GL (CI Disperse Yellow 2) and several Latyl dyes, namely, Yellow 3G, Cerise B, Violet 2R, Brilliant Blue 2G and Brilliant Blue BG, are recommended by the Du Pont Company for light shades where good fastness to light and wet processing is required. CI Disperse Yellow 2 is the most level dyeing of the yellows and has outstanding lightfastness but as shade depth increases, Latyl Yellow 3G is preferable since it has better sublimation fastness than CI Disperse Yellow 2, better build-up and working propertries than Latyl Yellow YL. Latyl Blue BCN is a level-dyeing, bright, neutral-shade blue particularly suited to use in light shades. It has good fastness to light and sublimation and is satisfactory for "wash-and-wear" uses if the amount of Latyl Blue BCN is limited to 1.0% based on the Dacron in the blend. This dye stains spun nylon in the AATCC #3 Wash Test.

Certain dyeing assistants increase leveling action by slowing down the rate of absorption. Sodium hydrocarbon sulfonates, such as Avitone T, and nonionic surfactants, such as Alkanol HCS surface-active agent, both have this effect, particularly with blue disperse dyes. At 1.5 g/l, Avitone T gives fairly good retarding and leveling, but where a greater effect is required, 0.25 to 0.5 g/l of Alkanol HCS should be used.

Latyls Blue 2R, Blue 4R, Blue LS and Violet BN are not used in very light shades since they strike fast and do not transfer appreciably. Latyls Brilliant Blue 2G and Violet 2R dye slowly and Latyl Blue BCN dyes somewhat faster, but these are considered the best in level-dyeing properties for producing blueness.

2) *Medium and Heavy Shades.* Dyes listed in Table II are recommended for medium and heavy shades on Dacron in blends with wool, rayon, or Orlon.

Latyl Yellow 3G or CI Disperse Yellow (Pr 625) or CI Disperse Yellow 23 can be used in moderate amounts in heavy shades, but where high concentrations of yellow are required, as in browns, Latyl Orange 3R or Latyl Orange NST are employed. However, in dyeing blends with wool to obtain maximum lightfastness, combinations of Latyl Cerise N and Latyl Yellow 3G or CI Disperse Yellow 23 are used.

In regard to the red components, Latyl Cerise B or Latyl Cerise N are recommended in amounts not exceeding 1.0% based on the weight of Dacron. Either Latyl Scarlet FSW or Latyl Red GFS should be considered for shades requiring higher concentrations of red. Likewise, the economical CI Disperse Reds 1 and 13 are useful on 100% Dacron or on non-wool blends in very deep shades, such as browns, navies and blacks, but are not suitable for light and medium shades because of poor lightfastness. Latyls Violet BN, Blue LS, Blue 2R, Blue BCN and Blue 4R can supply most of the blueness with small amounts of Latyl Brilliant Blue BG to correct the red shade change of some of these dyes in incandescent light. Latyls Blue 4R and Blue 2R require less of the Latyl Brilliant Blue BG to correct red shade change than Latyl Violet BN. Combinations of Latyls Blue LS and Violet BN appear particularly attractive for deep shades because of good economy, excellent fastness properties and minimum shade change in different lights.

CATIONIC DYES FOR DACRON TYPE 64———At the present time, shortcomings in the range of cationic dyes having adequate lightfastness for men's wear limit their use either to navy and black shades or to women's wear shades where brightness and good wetfastness are more important than the lightfastness requirement. Table III is a list of recommended dyes.

The economy resulting from the use of cationic dyes for navy and black shades is apparent from the dye costs of typical formulas shown in Table IV.

Disperse dyes in comparable shades cost approximately $22.00 and $27.00, respectively. These are comparisons of dye costs only. The expenses of carrier, labor and equipment time

are not included. These and other considerations, such as fastness properties, must be taken into account in the decision as to whether disperse or cationic dyes should be used.

SUMMARY

Piece dyeing of blends containing Dacron Type 54 and the new Dacron Type 64 with wool, rayon and Orlon has been discussed. Emphasis has been placed on improved methods of dyeing and the effects of dyeing rate, dyeing temperature, carrier selection and choice of dyes on quality and cost. Also, dyeing of Dacron in stock, top, tow and blended yarn form has been described.

The effect of preheat setting on dyeability of typical disperse dyes has been shown for a range of preheating temperatures. Data of this kind are being developed for entire ranges of disperse and cationic dyes.

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TRADEMARKS

The following are registered trademarks of E I duPont de Nemours & Co, Inc: Alkanol, Avitone, Celanthrene, Chromacyl, Dacron, Latyl, Orlon, Perclene, and Sevron.

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Washington Section———

LABORATORY TESTED AND APPROVED*

P J FYNN
Director, Research Laboratory
J C Penney Co

BY way of introducing my topic, let me give you a visual repeat of the announced title of the talk. In case some of you may fear this will turn into an unadulterated sales pitch, let me assure you that this slide is the only commercial on the program.

Many of you here tonight have a technical background and are accustomed to mathematical notation. I have a master formula which expresses a fundamental principle of merchandising.

$$\$ = \text{Style} + \text{Workmanship} + \text{Serviceability}$$

The term on the left side of our equation can be expanded

$$\$ = \text{Price} = \text{Cost} + \text{Profit}$$

Let's substitute

$$\text{Cost} + \text{Profit} = \text{Style} + \text{Workmanship} + \text{Serviceability}$$

I don't need to remind you, but I will, that anything you do to one side of an equation is going to affect the the other side. Any tampering with any of the terms is bound to alter the others.

Now, there are two terms in this equation which are most important in selling the item. These are price and style, pocketbook appeal and eye appeal. The other two terms keep it sold.

The terms on the left side do not require much discussion. The cost, you know, is the sum of what is paid to the manufacturer plus taxes, freight, taxes, insurance, taxes and other items of overhead. The profit is what you can put in your pocket after your chief competitor has inserted a variable in the price side of the equation, $C + P(K) = S + W + S$ (K is Sears-Roebuck coefficient). We are more concerned tonight with the terms on the right hand side of the equation.

STYLE———Style is a positive force of elusive characteristics somewhat analogous to an atomic nucleus —you know you have something there, but it's not always easy to say precisely what. Style and its handmaiden, fashion, airse from a union of creative imagination and salesmanship. The most spectacular of creative styles are those of famous designers who have achieved their Olympian character in the world of design by all the varied, and sometimes devious, routes that lead to success in whatever endeavor, but primarily by consistently producing highly commercial styles. The House of Dior, Balenciaga or Chanel will dream up a new creation in gown or wrap and because they have achieved a reputation and a following (nothing succeeds like success), their creations receive considerable attention. Other designers will copy them or use some feature in less exclusive garments. Much to-do is publicly made over the "pirating" of styles for use in popular-price ranges, but famous stylists could never build a reputation if, ultimately, their styles weren't copied, or, as it is commonly termed, "knocked off" for the mass market. All of the good designers are not in Europe or limited to the Ceil Chapman's and Ann Fogarty's in this country. Fabric producers, dress manufacturers and retail organizations have designers who contribute much to styles in color, fabric and garments.

While this constant striving for striking and appealing new style is most dramatic in women's seasonal apparel, it extends into lines previously considered to be staple items as witness the recent exciting color styling of blankets, sheets, pillow cases and towels.

WORKMANSHIP ——— The next term in the equation is workmanship. Workmanship is the skill and finesse with which a clothing item has been constructed from its component parts. It is possible almost at any time to find two men's suits made to the same style, from identical piece goods, by different garment makers. One suit may be priced very low and the other very high and the high-priced suit will be worth the price while the low-priced suit is no bargain—the difference is workmanship. One suit is cut and sewn like pajamas by sewing-machine operators; the other made by tailors, is stitched and shaped with care and with meticulous attention to detail.

I wonder how many of you have opened the seams in your suit jackets lately to see just what does go into making a suit?

In a large retail organization, which handles hundreds of types of merchandise, every type of procurement method is in use from buying the open market to complete specification buying, with all shades in between. High-style items are a rapidly changing, often one-shot merchandise, stronger on style than on other aspects and the workmanship is more a matter of integrity and quality level of the cutter. Of course, experience in the market and long-standing relationships between buyer and supplier determine the quality level of that workmanship. Where the retail organization takes a significant portion of a cutter's output and has maintained a relationship over a long period, the cutter recognizes the merchandising philosophy of the retailer and his acceptance standards and although the buyer isn't in position to stipulate every construction detail he and his supplier work together to build a sound line of garments.

At the other extreme in a line of more staple, high-volume merchandise, the buyer may buy greige goods to specification, have it finished to specification and contract the garment construction to his specific instructions on patterns designed and supplied by him. In such cases all details of stitches per inch, seam construction, thread size, buttons, tapes, snaps, zippers, print patterns, types of dyes and performance characteristics are all set down and checked periodically. In such an operation, workmanship is directly under control. In fact, this method of operation is a better way of maintaining quality standards than to have a factory as a company-owned subsidiary. If the garment cutter fails to meet specifications, he's holding the bag. If we owned the factory we'd have a lot of substandard garments to unload somewhere and that would surely distort the quality outlook of any buyer.

Let's digress a moment. We've been using the term "buyer" a lot. Perhaps it should be defined. In our organization a buyer is completely

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responsible for procuring one or more lines of merchandise for our stores. Within the framework of company policy, he has total authority, and if he has high-volume lines, he may wield considerable economic power —sometimes measured in millions or even tens of millions of dollars. He is a formidable business executive. Collectively, these buyers must wisely spend five million dollars each workday of the year and this year they will have supplied, at retail value, 1,400 millions of dollars worth of merchandise. Not only must our man be a buyer, but a salesman as well. He must represent his purchases to store managers in such a way that they will order his merchandise. The store manager is a free agent and buys what he feels is best for his customers and his own interests. A buyer cannot arbitrarily distribute his goods in the stores. I've taken time out to explain this because the word "buyer" is rather casually bandied about among department store workers where the job does not often have the stature implied here.

To return to the consideration of workmanship. The details of garment construction—size ranges— garment patterns, seam construction and other manufacturing details are not a laboratory function. These things are checked by the buyer and his assistants who make periodic visits to their supplier's factories and inspect workmanship on the spot. They also make dummy orders through stores which forward the merchandise to the buyer for a check on workmanship. If this program runs into a technical problem the buyer may consult the laboratory or the pattern department. Buyers are also responsible for checking competitive items for general quality and workmanship, and here, too, they call upon the laboratory to compare values not apparent by visual inspection. However, long and intimate association with a particular line of merchandise makes a buyer very sensitive to even minute departures from specified quality of workmanship and enables him to detect things that others would scarcely notice.

SERVICEABILITY ——— The last term in our equation, Serviceability, is the one which constitutes much of the justification for the existence of our laboratory. It is to insure the serviceability and satisfactory performance of our merchandise in the hands of our customers that most of the laboratory's 50,000 tests per year are run.

A few years ago an experienced buyer felt little, if any, dependence upon laboratory testing as an aid to buying sound merchandise. There were only four major natural fibers and two man-made fibers and in many lines only one or two fibers were of any importance. Time-tested constructions with simple finishes were easily learned and quality variables were readily spotted. The buyer operated "by the seat of his pants," to borrow a phrase from aviator's slang. No young squirt from a laboratory was going to tell him about wool suitings or cotton shirts. Of course, he might occasionally question a yarn count or challenge a dye type and then he'd ask the lab to corroborate his suspicions. But, my! How things have changed! It challenges even a technician just to keep up with the names of new fibers, finishes and processes, much less their proper identification and evaluation. Now the old-line buyer isn't much better off than the neophyte and neither can tell how much synthetic is blended with wool or how it will pill or wear just by seeing and feel ing the goods.

It is quite obvious that every piece of merchandise in the stores could not possibly be checked by the laboratory or even be seen by the buyer and it is no more than a planner's vision that a statistical quality-control system be operated in the factories of the thousands of suppliers. The method of quality control depends upon a basic quailty consciousness that permeates the entire buying organization and is made very apparent to the suppliers. Without this quality mindedness as part of the basic philosophy of operation, the laboratory could not be nearly as effective. Buyers do not fear the laboratory as a policeman, but lean upon it as a facility which offers the following services:

1) Quality check before purchase
2) Continuing check on laboratory seal items
3) Performance tests for informative labeling, care instructions and advertising.
4) Liaison with research groups and primary manufacturers
5) Central source of scientific and technical information
6) Examination of customer complaints.

When a buyer is considering a new line of merchandise or how to improve an old one he will have garments laboratory checked. Often he will come up and discuss proposed changes or innovations and, when prototype garments are submitted by his suppliers, he will send them for a laboratory report on the garment and its general suitableness for its intended end use and its ability to perform as advertised. Any special claims of colorfastness and dimensional stability to laundering or drycleaning, any special finishes like water repellency, crease recovery, "wash-and-wear," are checked. When items fail to perform as represented the item may be eliminated as one of several competing items or the buyer may bring his manufacturer to the laboratory for a discussion of ways and means of modifying the item to obtain the desired performance. As a case in point, this season the buyer of women's sports outerwear wanted every jacket in his line to be machine washable. The laboratory washed production samples of over fifty styles of jackets. Most of them had not been designed for machine washability even though they were made of washable components. Where there were failures the buyer brought in the manufacturer and with the jackets before us, suggestions for changes were made to prevent various ills, such as excessive puckering, differential shrinkage of components, lumping of batt interlinings, fraying out of lining seams, bleeding of trim, failure of buttons and such things. The new and improved garments were tested and when they were right for the intended use, care instructions were supplied for labels and our buyer had his new line of machine-washable jackets.

In similar fashion all new patterns of print goods for over-the-counter piece goods sale to home sewers are laboratory checked for shrinkage and colorfastness to washing, to light, to crocking and to drycleaning and fume fading where indicated. In recent years, since cotton fabric styling has resulted in its use for expensive, high-style dresses, women will hesitate to have these dresses washed even if they are washable cottons and they are sent out to be drycleaned. We have discovered to our own chagrin and embarrassment that sometimes colored cottons which are colorfast to the most vigorous laundering are not fast to drycleaning, so that the women who thought she was giving her expensive dress tender loving care got it back in unrecognizable form because somewhere down the line someone took it for granted that a thoroughly washable cotton color would certainly be safe in drycleaning.

All laboratory tests are based, wherever appropriate, upon the procedures and equipment outlined in the test methods of the American Association of Textile Chemists and Colorists. Where AATCC methods do not exist, we use recognized procedures from the American Society for Testing Materials or Commercial Standards or CCC-T-191 or, if necessary, we devise our own. Being on the money side of transactions gives us an advantage when it comes to specifying the tests to be used and the performance requirements.

There are many end-use considerations that must affect the level of acceptance, but, as a general rule, nothing is considered good if it breaks below twenty pounds, light fades in less than 20 Fade-Ometer hours, tears below 600 grams on the Elmendorf Tester, fades appreciably in a 1A, 2A or 3A wash test, fails in drycleaning, fades in less than two cycles gas fading, fails in less than 300 Taber cycles or 300 Stoll cycles abrasion, will not survive five appropriate launderings for durability of finish and so on.

If I went through each of the thirty five or so laboratory tests which we run routinely and a dozen or two other specialty tests and gave examples, we'd be here until midnight, so I hope no one will be slighted if I am not too specific about all of our laboratory procedures. I will be happy to supply information to any one with questions in this area. Because we examine goods from the end-use point of view and because we must always balance our equation with price and style, we do not have a single rigid set of fabric- or garment-performance specifications. A frilly, fragile-looking high-style blouse can be a thoroughly satisfactory consumer product with a fabric strength of fifteen pounds, but it would never be safe to allow a tailored print-cloth blouse to be less than twenty-five or twenty-three pounds. A man's stylish sport jacket for occasional wear is satisfactory in a fabric of soft-twist nubby yarns that has abrasion, snagging and pilling characteristics to make a laboratory technician shudder, but if you changed it to make it rugged it would no longer be what it is—a stylish sport jacket for occasional wear. Sometimes irrational customer attitudes frequently result in anomolous expectations. The more expensive a garment is, the less wear most customers expect. A mother will object vociferously if her child's $2.98 polo shirt fades in the first wash or his 69¢ socks shrink in the tumble dryer when she won't even bring back her $30.00 dress if it doesn't survive its first home washing—she'll say, "I shouldn't have washed it when it drycleaned so beautifully." And on the same theme, what is a more impractical garment from the standpoint of cost versus wear and care than a $300.00 Vicuna coat or a $3000.00 mink?

After a buyer has expended some effort to build several good advertisable features into a line, he may want to promote them under a laboratory-approval seal, particularly if it is not a one- season style item, but a staple long-run line. In such instances, it is necessary for the laboratory to keep an eye on the item on a periodic check test basis. It is surprising to see how some garment features have a tendency to diminish slowly, sometimes to the vanishing point and especially if they cost the manufacturer time, trouble or money. Fewer tucks, less stitches per inch, a different button or trim, a snip here and a snip there and six months after production starts you'd scarcely identify the item with the one that originally passed the laboratory test. So it becomes necessary to order in garments once in a while for a laboratory seal check. Of course, the laboratory does not ask the manufacturer for a sample. He'd be less than astute if a laboratory-ordered sample were sent in one stitch less than perfect.

Intimately tied into the first two areas of laboratory function just discussed is the determination of data on which to write informative labels and performance claims. Of course, there are many items which the buyer accepts just as the manufacturer presents them, but he does want to establish the level of launderability or the extent of compliance with the manufacturer's claims. The buyer may not care whether it is hand washable or machine washable just so he represents it honestly to his customers. In these cases the laboratory tests only in accordance with the advertising claims made. Certainly the buyer's attention is called to anything which might prevent the garment from serving its intended purpose.

The fourth and fifth items on the list of laboratory functions justify my appearance here on a program of the American Association of Textile Chemists and Colorists. To maintain leadership in merchandising, a large retail organization must have many eyes and ears; as many sensitive receptors as possible in the environmental stream of customer reaction, market lore, new technical developments in fibers, fabrics and textile finishes and testing standards, whether evolving by agreement or impending as legislated rules. The laboratory is the natural organ for this and its personnel is encouraged to be in the thick of things technical. I'm sure there's no need to labor this point.

One of the most exasperating yet often the most interesting of our laboratory functions is playing detective and amateur psychologist in the reconstruction of crime. Our version of the "Who done it" also involves "Who pays for it." Rarely does a customer have to stand the loss, but there could be a question of liability between retailer, cutter, converter or fabric and fiber manufacturers. Sometimes even commercial laundries or cleaners enter the picture.

It would seem that a large multiple-outlet retail organization would be an ideal set-up for collecting statistics on textile failures while in use. The information is there, but it is there like the gold in sea water—when extracted it scarcely pays the cost of the extraction. We feel that items returned to the stores are like the visible part of an iceberg, they are only an indication that the real bulk of the problem is submerged. There have been cases where a serious error has put distinctly faulty goods on the counters, goods that sold in abundance before being taken off sale, yet returns on the sold items were negligible. The collection and analysis by qualified technicians of all returned items would require an organization too costly for any possible gain that would accrue. Our stores have a policy to follow concerning returned goods and that is to return all faulty items to the manufacturer. Even though there is an economic advantage to the store manager in charging back to the manufacturer, we know that the factory does not receive 100% of all returns. For what they are worth, here are the factory returns in several categories of merchandise expressed as percent of unit volume: work clothes, 0.01%; women's ready-to-wear, 0.1%; work shoes, 0.25%; men's knit underwear, 0.005%; ladies hose, 0.05%. As you can see, these are very small values. In fact, more stuff than this is stolen from us by shoplifters. Again, only a small part of these ever come through the laboratory, so that in effect we inspect only a fraction of a fraction to the extent of about two thousand cases a year.

During this past year we have been cooperating with the AATCC Committee on End Use Performance Tests and reporting to it on its special report forms all of our laboratory returns.

Individual returns are usually a serious matter to the customer involved, which only stresses the amount of good will imperiled by such instances. For instance, this came from a store with a letter stating the customer wanted us to see what happened the first time she washed a pair of our woolen work pants. Even though they were not intended to be washable, the sales clerk must have left the customer with the belief that they were. The store manager said he replaced the pants, but was curious to know what really happened. Allegedly this is all that remained in the washing machine. Also allegedly, they were washed in conventional manner under mild conditions. This is the residue of a pair of 90% wool, 10% nylon cord work pants of which we sell thousands. At first we were inclined to believe that they were washed by some chance or other in concentrated sodium hypochlorite bleach, but that idea was quickly abandoned because the cotton waistband and pocketing is not tendered. Most assuredly either in use, abuse or in cleaning a strongly alkaline agent came into play. We know that wool over-exposed to shrinkage-stabilizing treatments can be so degraded as to go to pieces in hot alkaline soap solutions, but considering pants manufacturing methods, it would be impossible for only one or two or even a dozen pair to be unique in this respect. A bad lot of wool would bring hundreds of these down on our heads and no such avalanche has occurred —as yet. But we don't use processed wool and we didn't represent the trousers as washable—at least not in the price list.

In another case, a suit trouser was returned with no other information than a complaint of unsatisfactory service. The fabric was a conventional suiting of more than adequate body, strength and abrasion resistance and there appeared no flaw in the goods nor mistake in cutting or sewing to account for failure in the crotch. It just looked like some unusual condition of abrasion coupled with excessive perspiration—maybe the customer was a cycling buff or he wore a brace or a truss or something like that. We reported to the buyer, "No fault in garment. Failure caused by use under unusual conditions of wet abrasion." A copy went to the store and unfortunately the store manager gave his copy, intended only for intracompany use, to the customer. Along with a photostat of this report, the laboratory received a letter from our Western customer, to wit:

> "Dear Sirs: In regard to your attached report, undoubtedly I'm the best dressed bronco-buster that ever wet on a sandpaper saddle. This constitutes my final Penney purchase. From now on, more reliable brands will have to stand up under my rough and tough slide-rule wear while seated on my soft-cushioned chair in our air-conditioned office."

I still think our customer, at some time or another, probably long forgotten, subjected his trousers to extraordinary conditions of wet abrasion.

Another store letter reads,

> "One of our better customers returned a dress she had made from our cotton sateen print #1207. The dress was cleaned for the first time by one of our better drycleaners and he is blaming the fabric for excessive fading. He claims his solvents could not possibly have caused it. This cleaner has adopted the same attitude once or twice before and we would like to put a stop to it. Our customer believes she is not only entitled to her purchase price on the goods, but also to a refund on the dressmaker's price."

Our report to the buyer stated,

> "An original piece of the customer's fabric was tested and found to be unsatisfactory to drycleaning. This return is justified."

Now, when you consider all aspects of this situation, just what is fair? The buyer had no business to buy fabric when the laboratory told him it would not dryclean. But, it was probably a high-style color the stores were screaming for and he was supplying the best available anywhere. Besides, who drycleans cotton? Evidently somebody does. On the other hand, it must be a pretty stupid or callous "better" drycleaner who doesn't recognize that pigment prints on cotton can fade or change shade in solvents. If he runs a responsible shop, his counter man should inform the customer that cottons sometimes fade in drycleaning and ask if she will assume responsibility—if he gambles, he should be prepared to lose once in a while. If we start putting a big fat "Do Not Dryclean" on our cottons I wonder who will yell first. I'll bet it won't be the laundry.

I'd like to quote another customer complaint submitted directly to the laboratory.

> "My husband says Penney's has lost a good customer for men's jeans because the zippers are no damn good. They seem to lock, but 15 or 20 minutes later they unlock themselves and begin sneaking open. A guy can catch cold that way! He likes the jeans fine except for that, but you should do something about those zippers before I have to bail him out of charges for indecent exposure."

This one is so recent that the garments haven't yet been sent into the laboratory for exchange with new garments as we requested in our reply.

On the horizon of our modern living is another problem that some are trying to shove onto the textile trade. Here's a sample from a store letter,

> "Our customer tells me that, even after washing, the color on her child's pajamas ran onto a brand new white sofa made of plastic which is now tinged with pink. What can be done to remove the pink from the sofa? We are forwarding the pajamas."

This is one of at least six similar situations come to our attention since the first of the year. The unhappy fact is that vinyl plastic simulated leathers are not compatible with naphthol dyes, especially naphthol red. The plasticizer dissolves the dye and distributes it deep into the plastic where no means short of cutting it out with a scissor will remove the stain. Who's to blame for that? Naphthols have been a stout prop in the textile structure for years. If white vinyl plastic sheet is vulnerable to tried-and-true textile products, then it is unsuitable in its present state for upholstery material. We've had to reupholster furniture claims like this.

We never like to think our customers are deliberately falsifying their reports of failure and we hope no store manager ever accuses a customer of lying, but it is surprising how many laboratory-tested fabrics go to pieces or fade miserably when they have only been washed once by hand in mild soap flakes. My favorite story, and it is a true one, concerns a customer who returned an all-wool blanket that was reduced to the size of a desk top and was about as stiff as the desk pad. She was heatedly trying to convince the manager that his no-good blanket shriveled up the first time it was washed, by hand, in

mild soap just like is said on the directions. After a minute or two, she looked down at her five-year old child, who had been tugging at her skirt. "Don't you remember, Mommy," the child said, "when you took it out of the washing machine you said 'the water was too damn hot' "?

It is not every retail organization that feels it can support extensive laboratory facilities. For them the testing that is done by makers of quality branded merchandise must suffice. For our own organization, operating a consumer testing laboratory is a natural extension of the habits of the founder. In his early days, when on buying trips to the city, he would wash fabrics in his hotel wash basin or leave them pinned to the curtains in a sunny window for a week to see if they would fade.

We feel that the impact of modern technology upon the textile industry makes it absolutely imperative for a retail organization such as ours to have a laboratory to protect our buyers and insure that our customers receive what the pay for.

Membership Applications

FEBRUARY 4—FEBRUARY 17, 1960

NEW ENGLAND REGION

Northern New England Section

Senior

James P Casey — Demonstrator, chemist, National Aniline Div, Allied Chem Corp, Boston, Mass. Sponsors: D H Thomas, W C Brown.

Robert Rodgers—Dyer, Sagamore Color & Chem Co, Boston, Mass. Sponsors: E J McNamara Jr, J P Ploubides.

Raymond J Terrio—Asst plant supt, J P Stevens & Co Inc, Worumbo Plant, Lisbon Falls, Me. Sponsors: A E Guidotti, J J O'Neil Jr.

Transfer to Senior

Morris N Hahn—Tex chemist, Lancashire Textile Processing, New Bedford, Mass. Sponsors: G M Kidder, G J Mandikos.

Rhode Island Section

Senior

Michael A Silvestri — Research chemist, Warwick Chem Co, Div Sun Chem Corp, Wood River Junction, RI. Sponsors: H B Goldstein, D Koenig.

Gerhard E Sprenger—Res mgr, Warwick Chem Co, Div Sun Chem Corp, Wood River Junction, RI. Sponsors: H B Goldstein, D Koenig.

Junior

Raymond V Kusiak—Res & dev, Warwick Chem Co, Div Sun Chem Corp, Wood River Junction, RI. Sponsors: H B Goldstein, D Koenig.

Western New England Section

Senior

Ronald J Zolla—Colorist, Housatonic Dyeing & Printing, Derby, Conn. Sponsors: H Sandler, F P Vagnini.

CENTRAL ATLANTIC REGION

Delaware Valley Section

Senior

Edgar H Walls—Gen mgr, Weissport Dye Works, Weissport, Pa. Sponsors: C H Schuettler, E E Rettberg Jr.

Transfer to Senior

Richard H Brehm III — Dyer, Brehm & Stehle, Philadelphia, Pa. Sponsors: R B Stehle, W H Bertolet III.

Hudson Mohawk Section

Senior

John S Sweet—Asst chief chemist, Albany Felt Co, Albany, NY. Sponsors: C C Gordon, I J Smith.

Metropolitan Section

Senior

Raymond L Rodin—Res chemist, Pfister Chem Works, Ridgefield, NJ. Sponsors: A Bendelius, C W French Jr.

Associate

Martha A Park—Acting dir, Home Economics Div, State University College of Education, Plattsburgh, NY.

Transfer to Junior

Ashok M Patel—Student, Long Island Univ, Brooklyn, NY. Sponsors: G M Kidder, G J Mandikos.

SOUTHERN REGION

Piedmont Section

Senior

Paul E Fowler—Dyer, Burlington Industries, Dublin Finishing Co, Dublin, Va. Sponsors: W J Ratcliffe, P R VanKerckhove.

Claude S Hughey—Shift dyer, Kendall Co, Bethune, SC. Sponsors: L Delk, W M Brown.

Chauncey L Martin—Tech service, Minnesota Mining & Mfg Co, High Point, NC. Sponsors: J E Gill, P A Torrence Jr.

Jeremiah W Weaver—Asst dir of res, Cone Mills Corp, Greensboro, NC. Sponsors: H L Mercer, F S Perkerson.

Junior

Edward B Baldwin Jr—Chem engr & chemist, res & dev, Fieldcrest Mills Inc, Spray, NC. Sponsors: J F Byrd, J W Arnall Jr.

Bobby Ford—Lab tech, Spinners Processing Co, Spindale, NC. Sponsors: W E Chapman, C J Graham.

Peter A Moretti—Chemist, Products Development Lab (textile lab), Cranston, RI. Sponsors: L R Scolavino, A E Medas.

Samuel G Parler—Project chemist, Res & Dev Div, Riegel Textile Corp, Ware Shoals, SC. Sponsors: A T Clifford, A J Owens.

Dennis E Pike—Chemist, Lyman Printing & Finishing Co, Lyman, SC. Sponsors: D B Deaton, A E Davidian.

Associate

Earl M Moses—Sales rep, Silicones Div, Union Carbide Corp, Atlanta, Ga.

Transfer to Senior

James E Lonon Jr—Asst dyer, Eugene Cross & Co, Marion, NC. Sponsors: W C Lonon, D G Waller.

Transfer to Junior

Willie L Hodge—Mfg trainee, Albany Felt Co, St Stephen, SC. Sponsors: G M Kidder, G J Mandikos.

Southeastern Section

Senior

William H Faulkenberry—General supt, Eagle & Phenix Finishing Plant, Div Reeves Bros Inc, Columbus, Ga. Sponsors: L Tigler, H J Gambert.

Junior

Jay B Sales—Lab tech, Dalton Carpet Finishing Co Inc, Dalton, Ga. Sponsors: S R Foster, M S Morrison Jr.

WESTERN REGION

Mid-West Section

Senior

Frank R Kappler—Tex chemist, American Institute of Laundering, Joliet, Ill. Sponsors: L G Johnston, G H Johnson.

Associate

Don T Ho—Librarian, Minnesota Mining & Mfg Co, St Paul, Minn.

June C Wilbur—Asst prof, tex & clothing, University of Maryland, College Park, Md.

Sidney L Withrow—Vice pres, Klem Chem Inc, Dearborn, Mich.

Pacific Southwest Section

Transfer to Junior

Eugene Kim—Technician, Hollywood Textiles Inc, Los Angeles, Calif. Sponsors: G M Kidder, G J Mandikos.

STUDENT CHAPTER

Georgia Institute of Technology

Thomas H Banks—Student, Georgia Institute of Technology, Atlanta, Ga. Sponsor: William Postman.

James H Currey—Student, Georgia Insititute of Technology, Atlanta, Ga. Sponsor: William Postman.

James L Urquhart—Student, Georgia Institute of Technology, Atlanta, Ga. Sponsor: William Postman.

UNCLASSIFIED

Senior

Frank J Deegan—Sales mgr, Ciba Co Ltd, Dorval, Quebec, Canada, Sponsors: W H Kieffer, P J Luck.

Minutes———

201st Meeting
TECHNICAL COMMITTEE ON RESEARCH

THE 201st meeting of the Technical Committee on Research was convened at 9 am on Friday, January 22, 1960 in the Red Room of the Sheraton-Atlantic Hotel, New York, New York, with the chairman presiding.

The following were present:

C A Sylvester, *chairman*, TCR
G S Wham, vice chairman, TCR
C W Dorn, chairman, ECR
W G Helmus, president, AATCC
C T Anderson
W D Appel
E Artim
R F Aurich
M J Babey
C A Baker
C H Bayley
V L Chase
E M Eddington
S M Edelstein
W E Fayssoux
F Fortess
A H Gaede
H B Goldstein
H E Hager
E C Hansen
L L Heffner
V B Holland
W A Holst
A I Hultberg
R N Ingram
A E Johnson
J H Jones
E R Kaswell
G M Kidder
W Klaas
E W Lawrence
G O Linberg
L S Little
E M Lynch
G J Mandikos
A F McLean
H E Millson
E Morrill
J D Mosheim
G P Paine
G M Richardson
D W Robinson
C H A Schmitt
R B Smith
R H Souther
F H Steiger
H W Stiegler
R B Taylorson
G R Thompson
N A Truslow
J F Warner
H W Wolf
P J Wood
R K Worner
C L Zimmerman

REPORT OF DIRECTOR OF RESEARCH———H W Stiegler reported that Research Associate G M Kidder was working in close cooperation with the Committee on Damage Caused by Retained Chlorine on the Chlorine Retention Project, which is one of the principal projects assigned to the AATCC Headquarters Staff. More specific information on this subject would be covered by a subsequent speaker, R F Aurich, immediate past chairman of the Committee.

Excellent progress is being made on the production of the new lot of Blue Lightfasness Standards under F J Rizzo's careful supervision. This was made possible through the good offices of S J Kennedy, research director for textiles, clothing & footwear at the Quartermaster Research Center, Natick, Mass. This work is complicated and time consuming, requiring attention as to the procurement of proper wool stock, dyestuffs, dyeing, blending and spinning operations and finally through the all-important checking and testing phases. As the production nears completion, special consideration will be given to suitable packaging and storage. In this connection, Dr Stiegler pointed out that careful storage of these standards should be maintained by the laboratories which use these standards. He suggested that they be kept away from light, fumes, dust, etc, wrapped or preferably sealed in polyethylene plastic.

For the first time in years, a Crockmeter had been returned after considerable use during a four-year period. The laboratory returning it felt that it no longer gave reliable test results because the wooden "finger" had worn unevenly and there were deep grooves in the wooden base. This Crockmeter had been returned in a spirit of cooperation and enlightenment in order that future models might be improved. Dr Stiegler noted that the newly authorized manufacturer of the Crockmeter, Atlas Electric Devices Co, was in the process of developing a metal Crockmeter, which would preferably eliminate the undesirable features of the wooden model.

Attention had been directed to Fig 1 on page 76 of the 1959 *Technical Manual* in Tentative Test Method 90-1958, Detection of Antibacterial Property of Fabrics: Agar Plate Method. This cut incorrectly shows how to inoculate phenol dilutions in that the holder for the needle and loop is below the lip of the test tube. Such a position might allow possible contamination by accidental touching of the holder to the sides of the test tube. Although a trained bacteriologist would most likely correct the procedure indicated, the cut would be remedied for publication in the 1960 *Technical Manual*. Dr Stiegler stated that constant attention was given to improving existing test methods as to clarity of expression even though test methods passed through several drafts and editorial reviews before initial publication.

Another project nearing completion was the development of an edge-wear test for abrasion resistance designed to simulate the effects of natural wear on seams, collars and cuffs by means of the Accelerotor. Dr Stiegler and Mr Mandikos had met with Mr Gobeil, chairman of the Committee on Resistance to Abrasion, for a preliminary discussion of data developed for consideration by the Committee. Dr Stiegler noted that an excellent job had been done by the Staff in mounting approximately 144 test specimens on 18 charts. Results obtained with a range of nine fabrics were clearly presented for subjective evaluation. Mr Gobeil requested that the preparation of test specimens and the test procedure be modified to permit objective evaluation, such as for tensile strength loss. Accordingly, a test method would be drafted in anticipation of a proposed interlaboratory test by the Committee.

At the previous TCR Meeting, Dr Stiegler had referred to a communication received regarding certain inadequacies of the Colorfastness-to-Water test, specifically pertaining to chlorinated swimming pool water. This situation was subsequently brought to the attention of M J Babey, chairman of the Reference Committee on Colorfastness to Water, who would reactivate the Committee for review and action on this matter.

Proposal would be made for the reactivation of the Reference Committee on Resistance to Insect Pests to consider improving the specifications for the Moth Test Cloth in view of reports that variable results were being obtained, the latest coming from C H Bayley of the National Research Council of Canada. It was felt that the physical construction and surface condition of the test cloth were important factors insofar as the larvae were concerned. Dr Stiegler theorized that the source of the wool for the various productions of the test cloth might be important since insecticides such as DDT or Dieldrin were used in sheep dips with some of the insecticides possibly being retained through to the final stage of production .

COMMITTEE ON WASH AND WEAR (RA61)———G M Richardson, chairman, presented the annual report for Committee RA61 as follows:

"The work for 1959 of this Committee is characterized by two accomplishments; namely agreement on a clear definition of our objective and important refinements in test procedures.

"The Committee's objective is to evaluate the appearance of garments or consumer products. Work has been and will continue to be directed toward the development of practical, reproducible test methods for evalua-

ting the 'wash-and-wear' appearance of garments or consumer products, excluding those properties that may properly be in the scope of studies being made by other AATCC research committees.

"With this objective before them, our subcommittees have directed their work toward evaluating essential characteristics of 'wash-and-wear' garments and consumer products. Active programs are being carried on by subcommittees to develop procedures for evaluating the appearance of pleats, creases and seams, one or more of these being essential components in most garments. Test procedures for the appearance of these components may be applied either before or after washing or even after wearing.

"Interlaboratory tests have been conducted to demonstrate that Tentative Test Method 88-1958 'Appearance of Fabrics after Home Laundering' can be successfully used for evaluating a variety of fabrics (corduroys, chenilles, embossed fabrics and others) having special surface effects.

"An alternate procedure for Tentative Test Method 88-1958 involving the use of plastic replicas instead of photographs has been recommended. This along with a suggested change in scope to include fabrics having special surface effects has been voted on by letter ballot.

"Plans for 1960 include programs to develop new lighting and viewing procedures that are more readily adaptable to use on garments. The lighting studies are aimed at introducing overhead diffused light instead of low angle light. Placing test samples in a vertical position will permit the method to be used for garments hanging on a hanger. It is hoped that these two changes will broaden the usefulness of the method to the textile industry.

"The Committee is alert to the fact that at least three new objective test procedures have been announced during the year. In order to keep abreast of these developments and their effect on our work, a subcommittee has been formed to continually evaluate new methods as they are announced. In this way new technology will be considered for introduction into our methods."

COMMITTEE ON COLORFASTNESS TO WASHING (RA60)——— R B Smith, retiring chairman of Committee RA60, reported as follows:

"At the meeting of the Washfastness Committee, Virgil D Lyon was installed as the new chairman of the Committee.

"Mr Lyon introduced C H Bayley of the National Research Council of Canada, who had some proposed changes in the wording of Tentative Test Method 61-1959, which he would like to discuss with the Committee. These were discussed one at a time along with the corresponding paragraphs from the method as circulated to TCR. The wording was changed slightly, but only in an editorial sense and not in the technical meaning.

"The meeting was then opened for new business. A discussion then ensued on the IIIA Wash Test as regards rate of color loss versus the staining produced on the multifiber test fabric. It was brought out that, with some of the newer fibers, a much better relationship between staining in actual use and in the Test Method occurred at 140°F rather than at 160°F. The history of the Test Method was given and the reasons for the use of 160°F were given. After much discussion it was agreed that, at the next meeting, samples of tested material should be brought in and the whole matter discussed again."

COMMITTEE ON DAMAGE CAUSED BY RETAINED CHLORINE (RA35)———Retiring chairman R F Aurich presented the following report:

"The three-year term of Richard F Aurich expired at the beginning of 1960. Albert C Nuessle, who was the unanimous choice of the Committee and whose nomination was subsequently approved by TCR, was seated as chairman and assumed charge of the Committee at yesterday morning's scheduled meeting. Mr Nuessle has served on the Committee since its inception, has been extremely active in all phases of the work of the Committee, has been chairman of the Formulations Subcommittee for the past three years, and has written numerous papers on various aspects of the chlorine-retention phenomenon over the past few years. Thus, the Committee feels it has made a very commendable choice as its new chairman.

"It will be recalled that, in the early part of this year, the Committee's general efforts were hampered considerably in attempting to resolve the 'drift' phenomenon uncovered the latter part of last year. The Formulations Subcommittee spent an enormous amount of time and effort in attempting to produce a 'drift'-free formulation for standard fabrics with which the various other subcommittees could work. It was felt that such a formulation was arrived at in September; and in the latter part of October, trials were run at one of the member laboratories' mills to produce sufficient fabric with which further experimentation could be conducted. Three resin-finished fabrics were produced at this time—two were designed to give damage in the intermediate range, which is the range in which there is the most difficulty in interlaboratory reproducibility, and one was finished in a triazone resin in order to produce a fabric that would give a low degree of damage so that the Committee might check reproducibility on this type of finish, which is being used to a large extent by the Industry today in finishing low-chlorine-retentive fabrics. The fabrics so produced, after suitable confirmation of their level of damage by the Formulations Subcommittee, were distributed to the various subcommittees in order that they could 1) carry on with their planned programs within the scope of their charge, and 2) to serve as a further laboratory test on interlaboratory reproducibility for medium- and low-damage fabrics. These two phases of work are at the moment being carried out.

"More specifically, the Prewetting and Chlorination Subcommittee is investigating the effect of total alkalinity of the chlorination bath and also the effect of different buffering mediums used to achieve the specified pH for chlorination as set forth in the Tentative Test Method. The Rinsing and Scorching Subcommittee has planned extensive experiments investigating the effect of the many variables in the rinsing operation. In reference to the Rinsing and Scorching Subcommittee, a new Chairman, L L Walmsley, has been appointed. It will be recalled that Mr Walmsley had previously served as chairman of the full Committee.

"At the last two meetings of the Steering Committee, considerable attention has been given to how the current program should, perhaps, be reoriented and what facets of the program should be more emphasized during the coming year. More specifically, the Committee has decided that more attention should be paid to the investigation and establishment of precision equipment for performing the present test method with the utmost control and reproducibility of every conceivable variable. This aspect of the work is to be carried on in

a coordinated fashion both by individual member laboratories and at Lowell. One of the original charges to Lowell, in its cooperative work with the Committee, was this very point of establishing precision equipment for conducting the test method. This particular facet of the work unfortunately suffered due to the various pressures of other phases of investigation during the past three years. However, in connection with the establishment of precision equipment, the Committee is in correspondence with manufacturers of textile-laboratory equipment in order to secure the benefit of their fund of knowledge on this type of work.

"More effort and attention will also be focused during the coming year on correlation of the Tentative Test Method with practice, ie, with both home and commercial laundering procedures. Unfortunately, the bulk of the work done to date on this aspect of the work has been with our original standard resin-treated fabric, which displayed the 'drift' phenomenon and, thus, generally limited the value of the home and commercial laundering programs that have been conducted.

"The Committee, of course, would hope, as a result of all its various facets of investigation, to be able to simplify the present Tentative Test Method, especially, perhaps, on fabrics that inherently have a high or low level of damage."

COMMITTEE ON COLORFASTNESS TO PERSPIRATION (RA52)——C H A Schmitt, chairman, made the following report:

"At the January 21st meeting of Committee RA 52, the following matters were discussed, and recommendations made.

"1) The importance of thorough wetting of samples has indicated to some members the need of a nonionic wetting agent in the test solutions and preliminary tests have proved the value without any ill effect on the shade or bleeding. A complete check will be made on the special dyed samples now available to the Committee.

"2) A small laboratory wringer has been found available and will be recommended for use in preparing samples. This is sold by Sears, Roebuck and Co (Kenmore Hand Wringer #7326—$8.90).

"3) A large consumer of upholstery fabrics asked the help of AATCC in solving its problem of complaints from perspiration on fabrics it had tested and found satisfactory. Check tests made for it by other laboratories confused the issue in that they varied so much from lab to lab. AATCC at Lowell referred the problem to us, which was handled as follows:

"Because the company showed its materials to be fast, yet its customer's poor, we asked that they send us its tests along with the fabrics in question. Acid and alkaline tests were run by a Committee member according to AATCC procedure, as well as by the so-called AATCC method followed by the plant.

"In each case, the tests we ran by its method came out exactly the same as the plant tests and showed the fabrics fast to perspiration. (This proved that interlab tests can be 100% accurate and comparative if one follows the procedure right to the letter). However, the tests run by the proper AATCC method showed alteration of shade on some samples, but in every case staining of the multifiber fabric was very bad. In other words, the reason for its problem was due to its failure to follow the AATCC procedure. We quote from its letter, 'in order to save time we only wet out the multifiber fabric, after which it is put in the Perspirometer with the dry sample of dyed cloth.' This is about the worst interpretation of the procedure that we have come across. In the next *Technical Manual* we will emphasize the importance of proper wetting and saturation of the fabrics, and complete adherence to the procedure as outlined.

"4) The tests conducted by four Committee members using the new and old Perspirometers were examined. These covered tests made on wool, cotton, and acetate with fast and fugitive dyes. On cotton, dyes containing copper, copper-aftertreated and copper-free dyes were tested. The results on all dyeings by both acid and alkaline tests, and in all four labs, showed the new simple perspiration tester to give identical results to the older, more expensive model. It was voted that we recommend the adoption of this new model providing the AATCC can be assured that we will not run into any problems on the question of patents. The present model requires a special spring device for setting the pressure, whereas our new model has the pressure applied with a 10-pound weight after which it is made constant by turning of the thumb screws. Whereas the older model loses pressure as the material between the plates dries out, the new model maintains a constant pressure during the full cycle of the test. This is accomplished through the addition of a second or pressure plate with four springs.

"As soon as AATCC clears the question on the patent, if there is one, they will become available at once for $50.00 for a pair (one for acid and one for alkaline tests) including plates and a single weight. Additional racks can be purchased at a nominal price.

"5) The Committee will now proceed with the second phase of its program or the checking of our method versus the various tests proposed on the Continent with the hope that we can agree on an international method. We are glad to know that they all recommend the AATCC Perspirometer. At the same time we will also test the validity of all methods by a series of actual body tests. It is hoped to complete the work in the coming months so we can be prepared to report at the coming ISO meetings in the fall.

"The question of the combined effect of light and perspiration was discussed and will be taken up with the chairman of TCR and the End-Use Committee.

"We wish to emphasize that the idea of close cooperation with our friends in CATCC has already proved valuable. The new perspiration tester which you see here was developed from an idea and model made by Carl Teichgraber of Domil, Ltd, Canada —a member of our Committee and one of the 'work-horses' of the Canadian Association."

COMMITTEE ON DRYCLEANING TEST METHODS (RA43)——In the absence of Chairman R T Graham, the following report was made by Committee Secretary A E Johnson:

"The Committee agreed to recommend the adoption of a new test for colorfastness to drycleaning, the basic characteristics of which are the running of the sample in the Launder-Ometer in 200 ml of perchlorethylene at 115°F for 30 minutes. The Committee will now move forward more actively in the development of a test for shrinkage in drycleaning."

A motion was made and seconded that the proposed test method for colorfastness to drycleaning as revised by Committee RA43 be circulated to TCR for letter ballot. After some discussion regarding the background for the revisions, such as the need for a higher temperature and correlation with repeated commer-

cial drycleanings, the motion was adopted.

COMMITTEE ON WATER RESISTANCE OF FABRICS (RA63)———Ruby K Worner, chairman of Committee RA63, reported as follows:

"At the meeting on Thursday, January 21, C G DeMarco reviewed the laboratory findings and the results of the statistical analyses of the data obtained in the interlaboratory study of blotters and the effect of laundering in the dynamic absorption tests by the tumble jar and Launder-Ometer metal tube methods. No significant differences with respect to reproducibility were found for either the different blotters or the two methods, but significantly higher absorption values were found with the tumble jar method.

"Since the level of test is different, comparison of results by the two methods would therefore be invalid. To avoid possible confusion, it was decided to eliminate the word 'alternative' in the Launder-Ometer metal tube method.

"The Committee approved Mr DeMarco's suggestion for further investigation of the effect of variables in the dynamic absorption test. Under his leadership, this task group will retain its membership, namely H B Goldstein, G J Mandikos and G A Slowinske. A first task will be the preparation—with the aid of TAPPI—of a specification for the present 'White AATCC Blotting Paper' prescribed in the Rain Test. This specification will be used in the AATCC water-resistance methods requiring special blotting paper and also in the ISO First Draft Proposal of the 'Method of Test for Water Penetration of Fabrics', now in preparation for consideration by Working Group No. 1 on Waterproofness Testing of ISO Technical Committee 38.

"Samples of eight fabrics have been received from the British Standards Institution via American Standards Association. These are to be tested in three different laboratories in the United States by the spray and hydrostatic head pressure test methods. The samples are part of an international series of interlaboratory tests being conducted under the auspices of ISO Working Group No. 1. Eleven countries and 20 different laboratories are involved. (The three USA laboratories include those of the AATCC Headquarters, E I duPont de Nemours & Co, Inc, and J P Stevens Co.)

"Mr Mandikos reported that the Atlas Electric Devices Company is well along with its construction of a motorized wringer that will meet the requirements of the dynamic absorption test. In addition, the wringer assembly can be used as a laboratory padder. It will have the advantage that the rolls are readily replaceable.

"Since the Suter hydrostatic pressure tester is no longer available commercially, the possibility of finding another manufacturer is being explored.

"As new business, the present test methods in the *Technical Manual* are to be critically reviewed along with their counterparts issued by other organizations. Revisions will be prepared if needed."

COMMITTEE ON DIMENSIONAL CHANGES IN TEXTILE FABRICS (RA42)———Committee Chairman E Artim reported as follows:

"Committee RA42 met on Thursday, January 21, 1960 and took the following actions:

1) Elected F A Murphy of Stevensons (USA) Inc, North Providence, RI, as secretary.
2) Heard results of TCR ballot on proposed shrinkage tests, which were 78 yes—12 not voting, for a unanimous approval.
3) Approved Draft #2 with editorial changes for presentation to TCR letter ballot of a new Tentative Method 'Relaxation and Felting Shrinkage of Wool Fabrics, Knitted and Woven.'
4) Agreed to continue work to develop method for measuring dimensional restorability characteristics of wool fabrics."

A motion was made and seconded that a TCR letter ballot be circulated on the proposed tentative test method "Relaxation and Felting Shrinkage of Wool Fabric, Knitted and Woven" as presented by Committee RA42. In reply to a question from the floor, Mr Artim pointed out that this test was applicable to textiles containing at least 50% wool. After this brief discussion the motion was adopted.

CERTIFICATES OF SERVICE———AATCC President W G Helmus presented Certificates of Service, in recognition of leadership and in appreciation of technical and scientific contributions to AATCC research and to the textile industry, to the following:

C W Dorn, consultant, chairman of the Executive Committee on Research (ECR).

C A Sylvester, E I duPont de Nemours & Co, Inc, chairman of the Technical Committee on Research.

V B Holland, Cannon Mills Co, member of ECR.

J H Jones, Phoenix Dye Works, member of ECR.

Certificates were also presented to the following retiring chairmen of Research Committees:

R F Aurich, Jospeh Bancroft & Sons, Committee on Damage Caused by Retained Chlorine.

S M Edelstein, Dexter Chemical Corp, Committee on Test Methods for Mercerization.

E C Hansen, General Aniline & Film Corp, Committee on Continuous Wool Scouring Processes.

R B Smith, N J Laundry and Cleaners Inst, Committee on Colorfastness to Washing.

F H Stieger, Rohm and Haas Co, Committee on Static Electricity on Textiles.

J F Warner, J P Stevens Co, Committee on Dimensional Changes in Textile Fabrics.

H W Wolf, J P Stevens Co, Committee on Evaluation of Fulling Agents.

The following were unable to be present and their certificates will be presented at meetings of their individual sections of AATCC:

J H Menkart, Harris Research Laboratories, Committee on Definitions.

J E Norton, Atlas Electric Devices Co, Committee on Colorfastness to Light.

G Switlyk, consultant, Committee on Statistical Methods.

REFERENCE COMMITTEES———Chairman Sylvester reported on a recommendation made by the Senior Staff Group at AATCC National Headquarters that the status of the reference research committees be reviewed by ECR. It was the consensus of the Staff that a few committees were either obsolete or duplicates of active research committees, eg:

RR5 —AATCC and Throwsters Research Institute Cooperating Committee.
RR10—Cooperation with Federal Government on Uniform Fabrics.
RR14—Physiological Effects of Textile Finishes.
RR17—Transfer of Color.

At this point there was considerable discussion regarding reference committees. The suggestion was made that the Reference Committee on the Evaluation of Wetting Agents, RR8, be reactivated. The recommendation was being made that RR26—Monograph No. 1, "Analytical Methods for a Textile Laboratory", become a sub-

committee under the Publications Committee. Chairman Sylvester would present these proposals and the sentiments of TCR to ECR for further discussion and action.

TCR LETTER-BALLOT RESULTS——TCR had approved by recent balloting the following new tentative test methods:

AATCC 61-1960T (incorporating a "mechanical" hand wash test).

AATCC 96-1960T (combining existing AATCC test methods for woven fabrics with ASTM methods for knit fabrics).

AATCC 97-1960T (determination of noncotton content of bleached cotton textiles).

AATCC 98-1960T (determination of alkali in bleach baths containing hydrogen peroxide).

Also approved by TCR were the following revisions:

AATCC 88-1960T (now provides for 1) alternative evaluation of "wash-and-wear" fabrics by 3-D replicas, and 2) enlarged scope to include fabrics having special surface effects).

AATCC 16A-1960T (restricts black panel temperatures to 145° ±5°F in Colorfastness-to-Light test method).

NEW COMMITTEE APPOINTMENTS——*E M Eddington*, Dow Corning Corp, to the Committee on Soiling of Carpets (RA57), Water Resistance of Fabrics (RA63), and Weathering of Textiles (RA64).

R S Hunter, Hunter Associates Laboratory, Inc to the Committee on Bleaching (RA34).

R K Kunkel, Celanese Fibers Co, to the Committee on Identification of Finishes on Textiles (RA45).

P A Majors, Hill Top Research Institute, to the Committee on Antibacterial Agents (RA31).

W M Russell, Chicopee Manufacturing Corp, to the Committee on Damage Caused by Retained Chlorine (RA35) and Determination of Odor in Resin-Treated Fabrics (RA68).

W S Taylor, R T Vanderbilt Co, to the Committee on Antibacterial Agents (RA31).

NEXT MEETING OF TCR——The next series of meetings will be held May 26-27 at the Sheraton-Atlantic Hotel, New York, NY.

ADJOURNMENT——The meeting was adjourned at 10:40 am.

Respectfully submitted,
G J MANDIKOS
Secretary, TCR

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks may be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

60-1

Education: BS and post graduate courses in chemistry and mathematics. Read and speak French and German.

Experience: All problems on dyeing and finishing of polyacrylic and polyamide fibers and their blends with other fibers; trouble shooting, adaptation of old equipment to new processes and original development work. Complete resume on request.

Position desired & location: Research, development or technical service in any of the above fields with responsibility and opportunity. Willing to travel, locate in North America, Europe or Australasia.

Age: 30; single; fit and ambitious.

60-2

Education: BS (chem & dye).

Experience: Chem engineer, finishing chemist, piece and skein dyer.

Position desired: More responsible position.

Location: West Coast preferred. (Anywhere).

Age: 40; married; three dependents; excellent references.

60-3

Education: High school, 2½ years of college.

Experience: Standardization and trouble shooting, head dyer and superintendent.

Position desired: Superintendent of dyeing, sales, production dyer.

Location: Anywhere.

Age: 34; married; three dependents; excellent references.

60-4

Education: Diploma, textile mfg; Certificate, paper chemistry.

Experience: Sales engineer, technical sales—sales service.

Position desired: Tech sales—sales service.

Location: Carolinas (open).

Age: 51; married, one dependent, excellent references.

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES
May 26-27 (Hotel Sheraton-Atlantic, New York, NY); May 26—Council Committees and Research Committees; May 27 (AM)—ECR, TCR; May 27 (PM)—Council

NATIONAL CONVENTIONS
Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); Sept 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

DELAWARE VALLEY SECTION
Apr 22 (Ladies Night, Northeast Shrine, Rockledge, Pa); May 20 (Outing, North Hills CC, North Hills, Pa); Sept 16 (Reading, Pa); Nov 4, Dec 9 (Philadelphia, Pa)

HUDSON-MOHAWK SECTION
Mar 27 (Chelsea House, Tribes Hill, NY); May 20 (Ladies Night); June 24 (Annual Outing)

METROPOLITAN SECTION
Mar 18, Apr 22 (Kohler's Swiss Chalet, Rochelle Park, NJ); May 20 (Ladies Night—Swiss Chalet); June, 1960 (Outing)

MID-WEST SECTION
Apr 30 (Schroeder Hotel, Milwaukee, Wis); June 18 (Outing, Cerami's Island View Resort on Browns Lake, Burlington, Wis)

NIAGARA FRONTIER SECTION
Apr 22 (Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Mar 18 (Colonial Country Club, Lynnfield, Mass); May 13 (Lowell Tech Inst, Lowell, Mass); Sept 9 (Outing—Wachusett Country Club, West Boylston, Mass); Oct 21 (Hotel 128, Dedham, Mass); Dec 9 (Colonial Country Club, Lynnfield, Mass); Jan 20, 1961 (Hotel 128, Dedham, Mass)

PACIFIC SOUTHWEST SECTION
Mar 11, May 13 (Rodger Young Auditorium, Los Angeles, Calif); July 16 (picnic); Sept 24-25 (Outing—Apple Valley, Calif); Nov 18 (Rodger Young Auditorium, Los Angeles, Calif); Dec 10 (dance)

PIEDMONT SECTION
Apr 2-3 (Hotel Robert E Lee, Winston-Salem, NC); June 3-4 (Outing—Ocean Forest Hotel, Myrtle Beach, SC); Sept 23-24 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Mar 25 (Providence Engineering Soc); Apr 29 (Student Night); June 24 (Outing—Metacomet Country Club); Sept 23 (Management Night); Oct 28 (Providence Engineering Society); Dec 2 (Annual Meeting—Johnson's Hummocks)

SOUTH CENTRAL SECTION
May 13-14 (Outing—Riverside Hotel, Gatlinburg, Tenn); Sept 10, Dec 9 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Apr 16 (Ida Cason Callaway Gardens, Pine Mountain, Ga); June 10-12 (Outing—Radium Springs Lodge, Radium Springs, Ga); Sept 10, Dec 3 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Mar 11 (Rapp's Restaurant, Shelton, Conn); Apr 8 (Rapp's Restaurant, Shelton, Conn); May 6 (Ladies Night, Rapp's Paradise Inn, Ansonia, Conn); June 10 (Outing, Wallingford Country Club—tentative); Sept 23 (Blake's Restaurant, Springfield, Mass); Oct 21 (Annual Meeting, Rapp's Restaurant, Shelton, Conn); Dec 2 (Rapp's Restaurant, Shelton, Conn)

WNE MEETING DATE CHANGED

THE location of the April 8th meeting of the Western New England Section has been switched from Hartford, Conn to Rapp's Restaurant, Shelton, Conn.

ACTIVITIES OF THE LOCAL SECTIONS

Piedmont

PIEDMONT SECTION held its Winter Meeting at the Poinsett Hotel, Greenville, SC, on January 23 with a total registered attendance of 336.

W F Robertson, vice president in charge of production, Riegel Textile Corp, led a general discussion on "Research in Textiles" at a morning meeting of the Section's Research Committee, which was attended by some 126 members and guests.

The afternoon technical session was attended by some 203 members and guests, who heard Norman Cassell, Interchemical Corp, discuss the technical and practical aspects of pigment printing, following which Victor S Salvin, Celanese Corp of America, presented highlights of the Section's 1959 Intersectional Contest paper, "Accelerant Dyeing of Hydrophobic Fibers".

182 members and guests attended the evening banquet at which the Greenville Barbers College Quartet entertained. Banquet speaker was R C Edwards, president of Clemson College, who outlined what his college is doing in training men for industry, and also went into the broader aspects of education, industrial development, and industrial research in South Carolina and the Southeast as a whole.

Piedmont Section Chairman Linton C Reynolds, Riegel Textile Corp, presided over the meeting, which was arranged by Sectional Committeeman E Thomas McIlwain, Ansbacher-Siegle Div, Sun Chemical Corp.

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Northern New England

O C HOLLAND, director of advertising for Interchemical Corp's Printing Ink Division will speak on "Color Magic" at the March 18 meeting of the Northern New England Section, which will be held at the Colonial Country Club, Lynnfield, Mass.

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Metropolitan

V S SALVIN, head, dye laboratory, Celanese Corp of America, will speak at the March 18 meeting of the Metropolitan Section. The meeting will be held at Kohler's Swiss Chalet, Rochelle Park, NJ.

Pacific Southwest

PACIFIC SOUTHWEST SECTION recently held the first of its four regular meetings for 1960 at the Rodger Young Auditorium in Los Angeles, Calif, with Walter Kramer, chairman, presiding. A total of twenty-seven guests and members responded to the notice of a strictly business meeting. Guests present were Gordon Fleming and John Shaeder. Those members present were: Walter Kramer, Dave Sanders, Paul Noonan, Richard Demuth, Clarice Lindsey, Stephen Luscian, Herbert Vogel, Fay Luzader, Walter Stocker, Leon Olsen, Angus Roberts, Everett Smythe, Robert Mishell, John Smith, Victor Boutin, Walter Wilson, Henry Pike, Serge Dadone, Edwin Lindquist, Joseph De La Barre, Sidney Springer, Frederick Willhelm, Hubert O'Brian, Raymond Hendricks, and Longinas Lasas.

Following the dinner, Mr Kramer opened the evening's business and introduced the aforementioned guests. The treasurer gave his report and the secretary summarized the minutes of the officer's meeting of December 3, 1959.

The calendar for the year was the next order of business, which led to a revision. The date of the next meeting was changed from March 18 to March 11, and it will be held in the Rodger Young Auditorium, Los Angeles. Additional business meetings will be held at the Rodger Young Auditorium on May 13 and November 18. A picnic is slated for July 16. The annual outing will be held September 24-25 at Apple Valley, Calif. The final event of the year will be a dance on December 10.

Volunteers were accepted to serve on committees for the various events scheduled for the year under the following chairmen: Victor Boutin, picnic; Serge Dadone, outing; Angus Roberts, dance.

Rather than name a chairman of an Individual Membership Committee, the Section voted to leave it to each member to try to obtain new members.

An Intersectional Contest Committee from the Pacific Southwest Section was formed, consisting of Thomas Lee, Paul Noonan, Stephen Luscian, Robert Fleigel, and Sidney Springer. The theme of the paper is to be "The Evaluation of the Effects of Smog on Optical Brighteners with Resin Finishes". Such evaluation is to be done by visual and spectrophotometric methods. It was agreed that artificial smog chambers will be used to obtain controlled results.

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Southeastern

APPROXIMATELY 150 members and guests attended the February 13th meeting of the Southeastern Section at Ida Cason Callaway Gardens, Pine Mountain, Ga.

The featured speaker at the technical session was Cleveland Adams, head of School of Textile Technology, Alabama Polytechic Institute, Auburn, Alabama. Mr Adams recently completed a six-week trip around the the world studying textile mills and a two-week trip to the Sudan in Central Africa on a governmental mission. Mr Adams discussed these trips with particular emphasis on the striking comparison between the industrial hardships of these handicapped, poverty-stricken countries with our domestic highly developed industrial status and prosperity.

Mr Adams made a plea to the members to consider what we can do to help these countries in view of their need for our assistance in matters where they can be led to grow independent. He stated that monetary considerations are relatively minor, but that the real need is for us to lead them into industrial independence and freedom.

Another feature of the meeting was an open discussion on fabric preparation, which was led by Benjamin S Daniel, plant chemist, Lanett Bleachery & Dye Works, Lanett, Alabama.

A card party was held for the ladies in attendance. Mrs Robert W Wurst served as hostess.

H Gillespie Smith addressed the members in the technical session and urged them to submit to the Scholarship Committee candidates for the scholarship offered by the Section. Mr Smith stated that one reason young men have turned their backs on studying textiles is that they want to be assured it is a good way to earn a livelihood. Mr Smith canvassed those present to determine their remuneration and proved by so doing that members of the textile and allied industries are well paid indeed.

Members enjoyed a banquet at the club house in the Gardens, climaxing this meeting planned by Ben Brinkley of Avondale Mills, Sylacauga, Ala.

News of the Trade

$1.5 Million Modernization Underway at Du Pont's Tech Lab

A one-and-a-half-million dollar program for renovation and modernization of sales service and development facilities at its Dyes and Chemicals Division Technical Laboratory at Deepwater Point, NJ, is well under way, with completion slated for late 1961, the Du Pont Company has announced.

Largest single project ever undertaken at the 40-year-old research center, the program represents the first major expansion of the laboratory since 1936. According to Du Pont, it will provide the most modern laboratory facilities for research in the division's original area of dyes, and also will answer the need for long-range research and development of industrial chemicals, many of which were introduced within the last decade.

"Services performed by the laboratory have been extended considerably over the last few years," Laboratory Director V R Hurka pointed out, "and new, modern equipment is essential in helping solve the many problems presented by consuming industries. The modernization program reflects an increase in Du Pont's research and customer service in the dyes and industrial chemicals fields."

Because no suitable building sites were available at the company's huge Chambers Works, the project entails renovation and adaptation of the existing three-floor building. End result will be a complete external and internal "face lifting." The program is being undertaken in sections to minimize interruption of work on current product development and sales service projects.

Already completed and in use are a new textile service laboratory and a new paper laboratory. The newest and most advanced laboratory equipment reportedly is being installed in each new section and when the program is completed, little of the original equipment will remain.

Employing approximately 225 workers, including about a hundred technical experts in specialized fields of dyes and chemicals application, the laboratory has been responsible for the development of a number of new and improved processes such as the Pad-Steam and Thermosol techniques of dyeing and finishing. In addition to research and sales service activities, the laboratory supervises the division's quality-control program, produces all of the division's technical literature, and serves as a training center for sales and technical representatives of both the company's Dyes and Chemicals Division and its customers.

Supplementing the sales service activities of the main Technical Laboratory are regional customer service laboratories at Atlanta, Ga; Charlotte, NC; Chicago, Ill; Portland, Ore; Rumford, RI; New York, NY, and Philadelphia, Pa.

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Dow to Produce Nylon 6 at James River Division

Plans for the construction of a plant to manufacture nylon 6 at the James River Division, Williamsburg, Va, have been announced by Dow Chemical Co.

The multi-million dollar plant reportedly will have an initial capacity of 12,000,000 pounds per year of filament yarn, particularly for use in tire manufacture.

Construction will begin shortly and completion of the plant is scheduled for late 1961. The new facilities will boost the Division's employment by approximately 250. Zefran acrylic staple fiber operations, started at James River in mid-1958, currently employ about 430.

The new plant reportedly will in no way affect operations at the Zefran plant, which is producing staple fiber for apparel and other uses.

It is expected the company's textile fibers department organization, headquartered at James River, will be expanded to handle marketing of nylon 6 in addition to Zefran.

Caprolactam, the principal raw material used in the production of Nylon 6, will be obtained from Dow Badische Chemical Co, a Dow-associated company with facilities in Freeport, Texas.

The addition of nylon 6 to the product line being marketed by Dow's textile fibers department gives the company an entry into the industrial field. Zefran acrylic fiber has basically found application in the apparel field; Lurex metallic yarn in home furnishings and allied fields; Rovana saran micro-tape in home furnishings and accessories. The company, by adding nylon 6, is thus broadening its base of fibers to serve all elements.

Hart Products to Produce Water-Phase Pigment Emulsions for Printing

Hart Products Corp, New York, NY has announced that production has started on Hartochrome colors, a series of water-phase pigment emulsions for use in the textile printing industry.

The announcement was made as the company officially opened the celebration of its 40th anniversary with a technical and sales meeting held at its Jersey City laboratories under the supervision of Milton Greene, sales manager.

Maurice Renner, head of the technical staff of the Pigment Division, demonstrated the printing and evaluation of Hartochrome colors on the recently installed laboratory equipment and conducted an inspection of the pigment color production plant.

The technical meeting concluded with a complete review of the latest developments in the field of thermosetting resins for the textile industry by Sidney Cohen, technical director of the Company.

•

GAF to Build New West Coast Branch Center

General Aniline & Film Corp will build a new west coast branch sales office and distribution center in San Francisco.

The new facility, which reportedly will have 45,000 square feet of floor space, will be a consolidated sales office and warehouse for the corporation's three main divisions—Ansco, Ozalid, and Dyestuff & Chemical—to serve western and northwestern states.

Ground-breaking ceremonies for the new building, which is to be completed by July 15, were held February 25 in South San Francisco.

The facility will be located in the Utah Construction and Mining Company's Industrial tract in South San Francisco.

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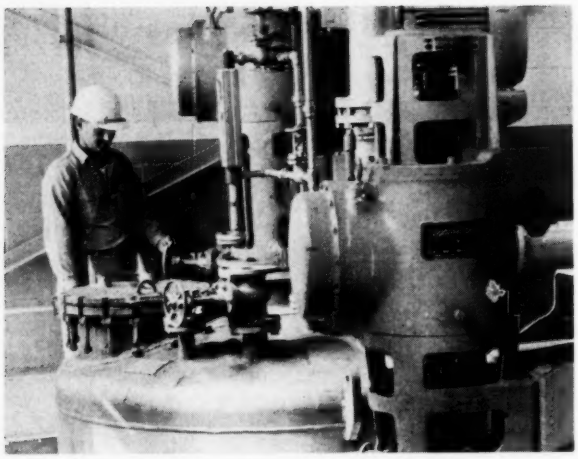
Vikon Chemical to Handle Puratized Line in South

Guard Chemical Co, formerly Gallowhur Chemical Corp, has appointed Vikon Chemical Co, Elon College, NC, as sole and exclusive sales agents in the Southern states for its Puratized line of textile chemicals.



Workman is charging ingredients into one of the stainless-steel reactors at the new acrylic plant of Catalin Corporation of America, at Fords, NJ.

Catalin Begins Full Production at Fords

Catalin Corporation of America has begun full-scale production at its new ten - million - pound - per - year acrylic plant at Fords, NJ.

Official opening of the new facility, which is producing a wide variety of emulsions and solutions for a number of different industrial applications, marks the completion of a major step in Catalin's current expansion into the growing acrylic field.

Based on a cross-licensing agreement with Union Chimique Belge, SA, Brussels, Belgium, the Fords plant's design and process equipment is patterned partially on a mutual exchange of technical information and know-how with UCB.

Because of product diversity, Catalin has designed the plant for maximum flexibility in production. Several products may be made simultaneously and careful planning has minimized the shutdown time required in switching over each unit to the production of a different product. Extensive use is made of stainless steel for reactors, raw materials handling equipment and other pieces of equipment to prevent contamination and assure highest purity and precise characteristics of products.

Built into the plant's design is a considerable expansion potential. Capacity can be quickly and economically increased by the addition in existing buildings of new reactors, for which supporting equipment—power and heat facilities, for example—have already been installed. In addition, Catalin also has ample undeveloped acreage for future construction at the site.

Also located at Fords, besides Catalin's other chemical and resin production facilities, are the firm's Central Research Laboratories, where experimental and application work in acrylic polymers and copolymers have been expanded.

Activities in this new field consist of development of entirely new chemical and resin products and production methods, testing and evaluating the suitability of these and previous products in various applications, including modifications to increase their usefulness in specific applications, and field service testing to determine the effects of various Catalin resins in customer products under actual use conditions.

Main Office, Lab of Skeist and Schwarz Labs Established in NY

Skeist and Schwarz Laboratories, Inc, announces that the main office and laboratory of the firm have been established at 101 West 31st St, New York, NY. The original location at 89 Lincoln Park, Newark, NJ, will continue as a branch office and laboratory.

Skeist and Schwarz Laboratories, Inc was established in 1957 as a consolidation of the consulting services of Irving Skeist, polymer chemist, and E W K Schwarz, fiber technologist. The firm specializes in plastics, adhesives and fiber technology, and textile dyeing and finishing chemicals.

•

CCDA Plans "Case History" Meeting

The Annual New York Meeting of the Commercial Chemical Development Association, which will be held March 16 and 17 at the Hotel Plaza, New York, NY, will deal with a Synthetic Case History in commercial chemical development. On March 16th the annual business meeting will be held.

As announced by J G Affleck, program chairman, the entire day of March 17 will be devoted to discussions between the development committee members of a mythical chemical corporation and the audience regarding the research, engineering, market development, and sales efforts of the company, as the company attempts to commercialize a new product discovered by research.

The program has been designed to be extemporaneous and it is believed that audience participation will be high.

At the completion of the March 17th program there will be a social hour and the Annual Banquet which will feature presentation of the 1960 CCDA Honor Award.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY
Apr 6, May 4, June 1 (Della Robbia Room, Hotel Vanderbilt, New York, NY)

AMERICAN COTTON MANUFACTURERS INSTITUTE
April 7-9 (11th Annual Meeting, Americana Hotel, Bal Harbour, Miami Beach, Fla); Mar 23-25 (12th Annual Meeting, Fontainebleau Hotel, Miami Beach, Fla)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Mar 31-Apr 1 (3rd Annual Textile Engineering Conference, North Carolina State College, Raleigh, NC)

AMERICAN SOCIETY FOR TESTING MATERIALS
June 26-July 1 (Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, NJ)

AMERICAN TEXTILE MACHINERY ASSOCIATION
May 23-27, 1960 (American Textile Machinery Exhibition, Auditorium, Atlantic City, NJ)

FEDERATION OF BRITISH INDUSTRIES
June 10-26 (British Exhibition of Industry, Technology, Science and Culture—Coliseum, New York, NY)

FIBER SOCIETY
Mar 10-11 (Spring Meeting, Roosevelt Hotel, New Orleans, La)

INTERNATIONAL TEXTILE MACHINERY EXPOSITION
1962 (3rd Exposition, Hanover, Germany)

INTER-SOCIETY COLOR COUNCIL
April 11-12, 1960 (29th Annual Meeting—Philadelphia Museum College of Art, Philadelphia, Pa)

NATIONAL COTTON COUNCIL
Sept 28-20 (9th Chemical Finishing Conference, Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 28-30 (57th Annual Convention, Hotel Roosevelt, New York, NY)

SOUTHERN TEXTILE EXPOSITION
Oct 3-7 (Greenville, SC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION
Mar 15, Apr 12 (Luncheon meetings, Hotel Roosevelt, New York, NY); May 11-13 (Spring Outing, Shawnee Inn, Shawnee-on-Delaware, Pa); June 14, Sept 13, Oct 11, Dec 8 (Hotel Roosevelt, New York, NY)

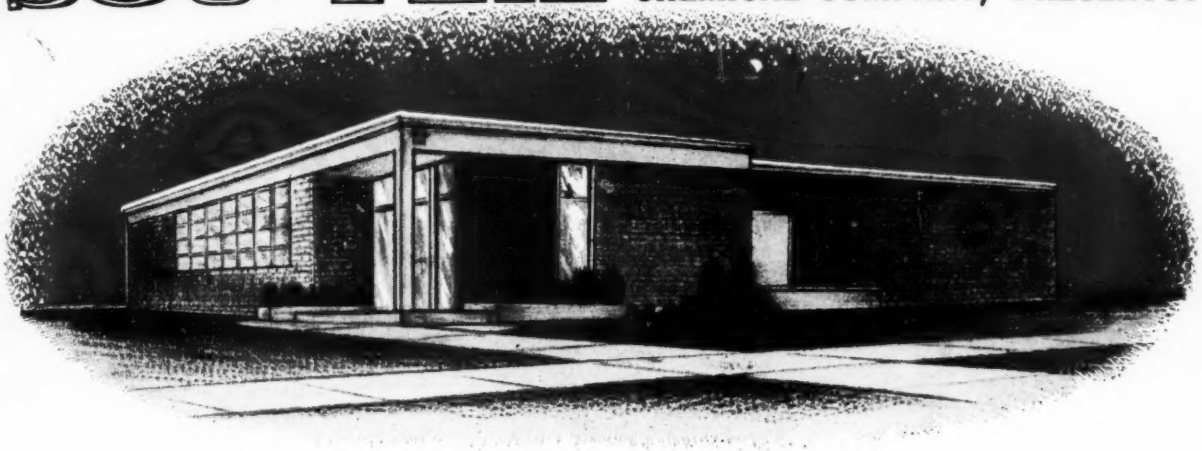
TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, DELAWARE VALLEY SECTION
Mar 26 (3rd Philadelphia Conference of the Graphic Arts Industry—Benjamin Franklin Hotel, Philadelphia, Pa)

TEXTILE OPERATING EXECUTIVES OF GEORGIA
April 23, Oct 22 (Harrison Hightower Bldg, Georgia Inst of Technology, Atlanta, Ga)

TEXTILE RESEARCH INSTITUTE
March 24-25, 1960 (30th Annual Meeting, Hotel Commodore, New York, NY)

WORLD CONGRESS FOR MAN-MADE FIBERS
May 15-18, 1962 (2nd World Congress, London, England)

SOU-TEX CHEMICAL COMPANY, PRESENTS!



2 NEW AGENTS FOR DYE FIXATION

CASSOFIX* FFL

- Unexcelled for maintaining light-fastness and shade on cotton and rayon dyeings
- Stable with water-proofing and other finishing agent solutions
- Fully effective at treatment temperatures of 90-100 F.
- Does not affect hand
- Does not impair dischargeability of prints
- Liquid product fully stable to storage

CASSOFIX* FRND

- Economical, All purpose product. Prevents migration and increases wash-fastness of cotton and rayon dyeings
- Unlimited resin pad bath stability
- Compatible with copper and calcium salts in concentrated solutions
- Unlimited storage stability

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SOU-TEX CHEMICAL COMPANY, INCORPORATED

MOUNT HOLLY • NORTH CAROLINA

Drimarene-Z Reactive Dyestuffs

With the Drimarene-Z brands, Sandoz, Inc, New York 13, NY has introduced the first group of a new range of reactive dyestuffs. They are concentrated products which have been specially developed for printing cotton and viscose filament and staple fiber. Along with the inherent properties of reactive dyestuffs they are said to show certain distinctive advantages which are of great value in practical application.

Sandoz reports that the excellent stability of Drimarene-Z printing pastes means that freshly prepared or partly used colors can be stored for a considerable time without deterioration; even after a period of weeks no decomposition effects and no precipitation occur.

The unfixed portion of dyestuff reportedly can be readily washed off the fiber, thanks to its low substantivity. The Drimarenes possess little or no affinity for cellulosic fibers. Another advantage of this property is that it prevents the take-up of loose dyestuff from the washing baths, and the consequent danger of staining on unprinted parts of the design.

Good stability to steam and heat is said to be another important feature of the new Drimarene-Z dyestuffs. They are fixed by short steaming or treatment in dry heat.

A simple printing method which is applicable with all the members of the Drimarene range allows individual brands to be combined in any desired proportions, it is stated.

It is further stated that the unlimited freedom of combination, the stability in steam and heat, the good washing-off properties and the excellent stability of the printing pastes together account for the further major advantage of these dyestuffs: the excellent reproducibility of shade.

In roller and screen printing, the Drimarene-Z dyestuffs are said to possess all the essential properties of reactive dyestuffs: they form a stable chemical linkage with the fiber, which results in high wetfastness; they can be printed alongside dyestuffs of other classes; and they give shades of unusual purity and brilliance.

At present the Drimarene range contains the following brands:

Yellow Z-4GL*
Yellow Z-3GL*
Orange Z-G*
Red Z-2B*
Violet Z-RL*
Blue Z-RL*
Blue Z-GL*
Turquoise Z-G*
Grey Z-GL*
Black Z-BL*

Plant demonstrations of printing with these new fiber-reactive dyes may be requested by calling any Sandoz District Office.

*Protected by patent rights in many industrial countries.

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Geigy Reactone Reactive Dyestuffs

A new line of reactive dyestuffs, known as Geigy Reactone, has been introduced by the Dyestuffs Division of Geigy Chemical Corp.

These latest reactive dyestuffs are said to be distinguished by brilliancy of shade, outstanding solubility, build-up to full shades, easy removal of unfixed color at moderate temperatures, and little or no staining on white grounds.

•

Lotol L-4634

A self-curing latex compound for carpet backing that is said to possess exceptional heat and light-aging characteristics, won't stain carpet facings or cause odors, has been developed by the Naugatuck Chemical division, United States Rubber Co.

The new material, Lotol L-4634, reportedly can be cured by merely drying thus making high-temperature curing unnecessary. The compound contains neither the usual sulfur curing agents no accelerators.

It is stated that absence of conventional curing chemicals from the compound improves odor and heat and light discoloration qualities. Prolonged tests of the new material in a Fade-Ometer reportedly showed little or none of the discoloration usually resulting from a heat and light exposure.

From the manufacturing standpoint, the new compound reportedly saves processing steps because it is a "one-package" system. It is claimed that, in most applications, there is no need to add plastic latices or hard resin extenders to improve hand. Used with ordinary fillers, it is said to give a high-strength, full-bodied hand with good resilience and resistance to deformation. It also is said to have excellent tuft or pile lock.

The compound is currently in production, and is being used by several carpet manufacturers.

Hiltonil Scarlet 2GS Base

Hiltonil Scarlet 2GS base has been made available by The Hilton-Davis Chemical Co Division of Sterling Drug Inc, the fifth purified fast color base it is offering.

Those previously introduced are Hiltonil Scarlet GC, Hiltonil Scarlet RC, Hiltonil Red KB and Hiltonil Garnet GBCP.

The new fast color base is the sulfate of Fast Scarlet 2G base. It reportedly has been demonstrated that the sulfate is easier to diazotize. It is standardized to one-half the strength of the Fast Scarlet 2G base.

The new base is said to be purified in order to provide clean diazo solutions that are free from objectionable tars. It is reported to be dispersible, for rapid wetouts, and dustless for ease of handling.

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Nylanthrene Green 2GFL

A new Nylanthrene green dyestuff for nylon stock, yarns and piece goods was announced recently by Althouse Chemical Co, Reading, Pa. Designated as Nylanthrene Green 2GFL, the new dye, according to Althouse, "will provide dyers and finishers with a more positive approach to true green. Of special interest to dyers and finishers is the achievement of level dyeing throughout nylon piece goods. It can be applied to dress fabrics, lingerie, draperies, automobile upholstery fabrics and carpeting."

Subjected to tests in the Althouse Applications Center, the new dye is said to have proven completely satisfactory. In the Launder-Ometer tests, the dyed fabrics reportedly showed no staining on fibers at 140°F wash. The Fade-Ometer tests reportedly showed a 7-8 rating with no break in shade.

Nylanthrene green is described as a new neutral-dyeing color for nylon, having excellent fastness to light together with very good fastness to washing. It reportedly exhausts well in neutral bath and has superior pile-on properties. Application-wise, it can be used on all types of dyeing equipment by following the usual dyeing procedures for Nylanthrene dyes.

The shade is said to be much brighter than those obtainable with the usual neutral-dyeing fast nylon colors. Of interest is the achievement of a fastness rating in a single green application which is claimed to be superior to those currently obtainable from mixtures of blues and yellows.

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Nopco 1186-A	A sulfated ester with outstanding wetting and rewetting properties for cotton fabrics
Nopco 1525	A 100% active nonionic ethylene oxide condensate with excellent acid stability
Nopco 2272-R	Low foaming sulfated ester. Performs as wetting and rewetting agent, penetrant, and dye leveler

SYNTHETIC FIBER LUBRICANTS

Nopcostat® Series	AS-40, LV-40, 2152-P, 2152-X. A family of highly antistatic lubricants for application to synthetic fibers and their blends. The Nopcostat Series provides the user with a range of fiber-to-metal and fiber-to-fiber frictional characteristics
Nopcotex® A	Non-soiling fiber lubricant recommended for processing natural and synthetic carpet staple
Nopcotex B	Processing aid for Corvel staple; antigraphite lubricant for lace yarns

CONING OILS

Konrite® A	All-purpose antistatic coning oil. Medium viscosity with built-in detergency
Nopcone® AR	Low-viscosity antistatic lubricant specially designed for bulk yarns and low denier synthetic filament yarns
Nopcone LV	Extra-low-viscosity lubricant designed for bulk and stretch yarns, polyamide, polyester and polyacrylic filament yarns

WARP SIZING PRODUCTS

Nopcosize® N	Modified polyacrylic acid for sizing of filament nylon
Nopcosize D	Water-soluble polymeric size developed for slashing Dacron* filament yarns
Nopco 1111	Plasticizer and lubricant for rayon and acetate sizes. Also used extensively in the soaking of rayon crepe yarns
Nopco 1440	Warp size bath additive that acts as a plasticizer, lubricant and penetrant for rayon and acetate sizes
Nopcolube® 55	Lubricant added to polyacrylic acid size bath for Nylon to eliminate topwaxing

*Trademark of E. I. du Pont de Nemours & Co., Inc.

WOOL AND WORSTED OILS

Nopco FUA®	Self-scouring all fatty wool oil
Nopcostat 56-C	Antistatic oil recommended for use on all woolens. Applied in range of 3-5% owf
Nopco 100	Blended fatty lubricant for wool and synthetic fibers
Worsted Oil 12®	Outstanding antistatic worsted lubricant. Provides optimum fiber-to-metal frictional characteristics and interfiber cohesion

DETERGENTS

Hyonic® PE	Series of polyoxyethylene condensates offering a range of oil and water solubility with numerous applications in the textile industry
Syntergent® 28-B	Nonionic raw wool scouring detergent
Syntergent 130-W	Low-temperature raw wool scouring detergent
Nopco 1479-D	Designed for the fulling and scouring of wool and worsted fabrics. High soda ash stability
Nopco 1658-C	An inexpensive detergent designed to replace soap for fulling and scouring on a pound-for-pound basis
Nopco 9092	Fulling compound with exceptional detergency. Will tolerate soda ash solutions as high as 14 ounces per gallon

DYEING AND FINISHING

Nopcotex	Trademark for Nopco's line of softeners. Products available for all phases of fabric finishing
Polymul® Series	Series of polyethylene emulsions used as pure finishes and softeners in resin formulations
Nopco 1425-B	Dye leveling and stripping agent recommended for acid, premetalized and chrome dyestuffs
Nopcosulf® Series	A group of sulfated vegetable, animal and marine oils which vary in activity and degree of sulfation. Used in dyeing, bleaching and finishing of cotton and synthetic fibers

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• NAMES IN THE NEWS •

Gerrow

The appointment of *William F Gerrow Jr* to the position of regional sales manager for the Southern area was announced February 8 by the Chemical Division of International Latex Corp.

Mr Gerrow will establish sales offices in Atlanta, Ga. Prior to his employment with the Company, he was associated with the Fulton Bag & Cotton Mills, Atlanta, as laboratory manager.

•

George D Grogan has been named general sales manager of the Pennsalt Chemicals Corporation's Industrial Chemicals Division. He succeeds *George R Lawson*, recently appointed general manager of Pennsalt's Chemical Specialties Division.

In a streamlining and expansion of the Industrial Chemical's Division's marketing activities, *W G Kayser Jr* has been named sales manager of organic chemicals, a newly created post. *Arthur F Bixby* becomes manager of sales for the division. *Melbourne P Binns* becomes product manager.

Mr Grogan has been associated with the Industrial Chemicals Division throughout his 22 years with Pennsalt and has held sales and supervisory positions since 1946. He was manager of chemical sales previous to his latest promotion.

Mr Kayser was engaged in chemical research and product development for several leading companies before joining the sales department of the Sharples Chemicals Division (now Industrial Chemicals Division) in 1946. He became a product manager in 1956.

Mr Bixby, who will supervise the administrative work of the division's sales activities, was formerly manager of marketing research.

Mr Binns joined Pennsalt in 1952 in the Development Department of Sharples Chemical Division in Philadelphia. He has been engaged in industrial chemical sales at Pennsalt's St Louis, Chicago, and Philadelphia offices since 1954.

Rittenhouse

The Virgina Smelting Co has appointed *George V Rittenhouse* to the position of district manager, Industrial Sales Division, with headquarters at 720 Madison Ave, New York, NY.

Mr Rittenhouse joined Virginia Smelting Company's staff in 1947 as a special sales representative in the New York area for the Industrial Sales Division's reducing agents used in the textile, chemical processing, and paper industries.

•

Vellucci

Metro-Atlantic, Inc has appointed *Anthony P Vellucci* to the staff of the Application and Sales-Service Labs.

Mr Vellucci will spend most of his time on the testing, evaluation and application of water repellents, resins, and other paper and textile auxiliary products.

•

Morton

W J Morton has joined the sales force of Althouse Chemical Co. Mr Morton will have an area of North Carolina and Virginia as his territory and will make his headquarters in Greensboro, NC.

Mr Morton was formerly with Burlington Industries at Greensboro.

Brice

Promotion of *J S Brice* to district manager of the southeastern district of Goodyear Tire & Rubber Company's Chemical division has been announced.

Brice, who formerly was senior sales representative in the district, took over his new post on February 1. He is headquartered in Atlanta.

•

Catalin Corporation of America has appointed *Joseph Sykes* and *John Rasberry* as salesmen in its Thomasville, NC, Divisional office.

Mr Sykes, who will be concerned primarily with the sale of Catalin textile resins in the Carolinas, was employed previously for six years by a dyestuff manufacturer.

Mr Rasberry, who will sell Catalin adhesives in the same two-state area, was employed previously in the pharmaceutical industry.

Both men recently completed the sales training course at Catalin's plant and research center in Fords, NJ.

•

J R Johnstone has been appointed administrative assistant in the office of *Wm H Feathers*, president of National Carbon Co, Division of Union Carbide Corp.

Mr Johnstone joined National Carbon in 1937 as a member of the industrial sales department. His most recent position was marketing manager of carbon products.

•

Two additions to the Ban-Lon Department staff have been announced by Joseph Bancroft & Sons Co, licensors of the Ban-Lon and Everglaze trademarks.

As part of an expansion program, *William A Geiler* has been named to the Field Service Group and assigned to the Ban-Lon hosiery program, where he will work under the direction of *Jack Huling*.

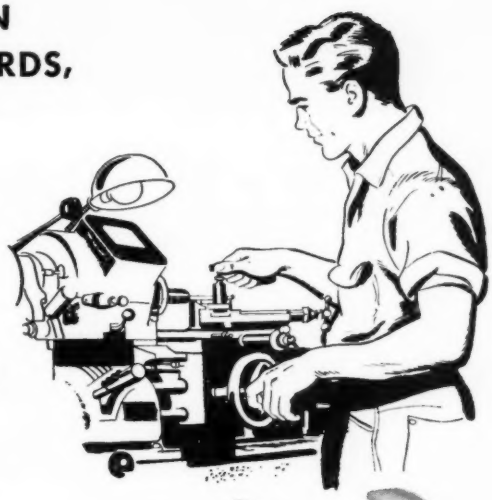
David Graham has been named to coordinate the Ban-Lon development in Canada. He formerly was associated with DuPont of Canada in merchandising work.

FOR SURE, SCIENTIFIC PROTECTION AGAINST INDUSTRIAL SKIN HAZARDS, SAFETY ENGINEERS SPECIFY

"KERODEX"

BARRIER CREAM

THE MIRACLE SECOND SKIN OF INDUSTRY



Thousands of users in every field of industry! A powerful shield against hundreds of industrial irritants!

"Kerodex" spreads like a cream; acts like an invisible glove. Won't smear, and won't affect — or be affected by — materials handled.

"KERODEX" 51 FOR DRY WORK

Protects against liquid and solid irritants not soluble in water. When washed off, expansion action provides "lift" that pushes particles and irritants away from the skin.

"KERODEX" 71 FOR WET WORK

Protects against water and water-soluble irritants. Hands may be washed while wearing Kerodex 71 because this cream does not wash off but gradually wears off.

NEW USES FOR "KERODEX" ARE DISCOVERED BY WORKERS, PLANT MANAGERS, ENGINEERS . . . ALMOST EVERY DAY!

Protects against acids, solvents, paints, cutting oils, resin. Write for literature.

EASY TO APPLY!

Just spread "Kerodex" lightly and evenly, rubbing hands together until cream is absorbed by the skin. Spread around wrists, between fingers, into the cuticles and under the nails. For heavy work, apply second coat in the same way.

PLEASE USE COUPON OR SPECIFY IN-PLANT TESTING OFFER ON PURCHASE ORDER

Protect your company against costly insurance claims, extensive sick leaves, production delays!

FREE! CONVENIENT BRIGHTWELL WALL-DISPENSER

SPECIAL IN-PLANT TESTING OFFERS AD350

AYERST LABORATORIES EXPIRES APRIL 30, 1960
22 East 40th Street • New York 16, N.Y.

☐ 1 dozen 1/4-lb. tubes "Kerodex" 51 for dry work at $10 per dozen
☐ 1 dozen 1/4-lb. tubes "Kerodex" 71 for wet work at $10 per dozen

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BY.....TITLE.....

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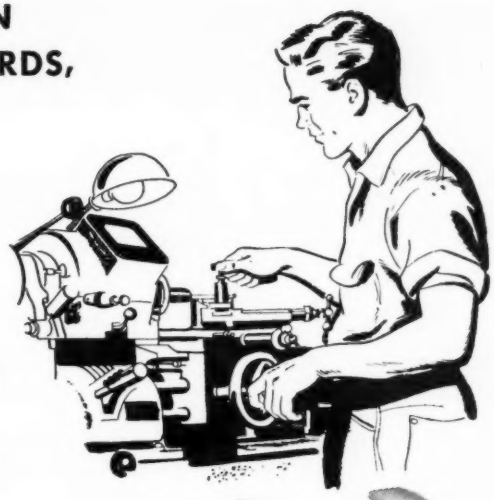

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Davis

Moss

Kloss

Beckedorf

Putnam Chemical Corp, Beacon, NY, has announced several personnel moves as follows:

Arthur S Davis, formerly manager of the technical service laboratory for Hilton-Davis Chemical Co, has joined Putnam in a similar capacity with head offices in Beacon.

Jack Moss has joined Putnam as technical sales representative assigned to the New England territory. He was previously associated with United Merchants, Sudantex de Uruguay, and as head chemist with both the VTM Finishing Corp and Colgate Piece Dyeworks.

Charles Kloss has joined Putnam as a technical demonstrator. He was previously dyeing and finishing superintendent of local commission finishing plants.

Hans Beckedorf has been promoted from technical trainee to technical demonstrator.

* * *

Your attention is called to an error in the January 25, 1960 issue, page 61, in which the captions under the pictures of L E Therrien and J B Young were switched. Mr Therrien is technical sales representative for Putnam Chemical in South Carolina; Mr Young is Southern technical service representative.

●

The appointment of *William F Ferrazano* as product manager, textile dyes for Allied Chemical's National Aniline Division, was announced recently.

Prior to his new assignment, Mr Ferrazano was a dye salesman for National Aniline, covering textile accounts in New York, New Jersey and southern Connecticut.

Marcus D Haney has been named assistant manager of the Southern district office of Du Pont's Dyes and Chemicals Division in a series of changes involving sales and technical positions in various district offices of that division.

Mr Haney will supervise all Southern district sales and technical service products other than dyes. Dye sales remain under the direction of *H H Field* and *W F Crayton* as assistant managers of the dyes sections of the district office. Mr Haney has been assigned to the Charlotte office in various capacities since joining the Du Pont Company as a dye tester in 1927.

Other changes in the Southern district, which embraces offices in Charlotte and Atlanta, include the following named to the positions indicated:

Atlanta—*J J Barnhardt Jr,* sales and technical supervisor for dyes; *J H Stradley,* technical consultant, dyes.

Charlotte— *J V Killheffer,* technical supervisor, dyes; *N R Vieira,* technical consultant, dyes.

J M Remsen has been named technical supervisor, in addition to his present duties as sales supervisor, in the division's Chicago district office, while in the New England district office, *J W Killheffer* has been appointed technical supervisor and *E H Gamble* has been named technical consultant. In the Philadelphia district office, *S H Loper* has been named technical supervisor; *P L Speakman,* Technical consultant; and *R L Riley,* office supervisor.

New York district office changes include appointment of *B F Quigley* as technical supervisor. *H Y Simerson* and *J S Thackrah,* both of whom have been associated with the New York office, have been transferred to the division's Technical Laboratory at Deepwater, NJ, as research chemists.

●

Howard S Bunn, president of Union Carbide Corp, New York, NY has been named chairman of Lehigh's University's 100-man committee on business and industry.

●

Banco, Inc, soliciting sales representatives for Joseph Bancroft & Sons Co, Wilmington, Del, and The Eddystone Mfg Co, Eddystone, Pa, has announced the election of three new officers.

George Forrest has been elected executive vice president. He had been vice president since 1953.

John J Horan succeeds Mr Forrest as vice president.

William R Shelly has been appointed sales manager of the Print Division.

Knowles

Bloom

Duggins

Prescott

Several important changes in personnel, and reorganization in the lineup of effort and responsibilities in the Commercial Development Department, Dyestuff and Chemical Division, General Aniline & Film Corporation, have been announced.

To strengthen its overall effectiveness, the Commercial Development Department has been divided into two sections. One of these will handle market development, and the other business research. Coincident with the changes outlined, *Cecil M Knowles* has been appointed manager, market development, with both the product development and sales department groups reporting to him, and *Albert Bloom* has been appointed manager, business research.

In the Market Development Section, both the product development and sales development groups are also now headed by new supervisors. *William E Duggins* has been appointed supervisor of product development, and *Francis J Prescott,* supervisor of sales development.

Richard T Ozimek, formerly supervisor of market research with Commercial Solvents Corp, has joined the Business Research Section as a senior market research engineer.

Dr Knowles most recently was administrative assistant to the general manager of the Dyestuff and Chemical Division.

Dr Bloom has been with GAF's Commercial Development Department since 1954 as manager—planning.

Dr Duggins and Mr Prescott have been product development engineers in the Commercial Development Department since 1952 and 1954 respectively.

Donald C Oskin has been named to the newly created position of vice president of executive sales of the Chemical Divisions, Food Machinery and Chemical Corp. At the same time he has been appointed a member of the FMC Chemical Divisions' Executive Committee.

In his new position, Mr Oskin will maintain contact with the top management of FMC's five Chemical Divisions' major customers. These divisions are Becco Chemical, Chemicals and Plastics, Chlor-Alkali, Mineral Products and Niagara Chemical. Mr Oskin will coordinate efforts of these five Chemical Divisions serving their major accounts.

Previously, Mr Oskin had been vice president and assistant manager of FMC's Inorganic Chemicals Department, which includes Becco, Chlor-Alkali and Mineral Products Divisions.

•

Central Yarn and Dyeing Co has announced the appointment of *Murray G Catin* as Eastern sales manager for its synthetics division.

Mr Catin will be officially connected with the company's sales organization, Kemfast Textiles, Inc, located at 1410 Broadway, New York. It was stated that Mr Catin will service sweater and sportswear companies using acrylic and woolen yarns, as well as other knitters and weavers of spun and filament yarns.

Mr Catin, formerly sales manager for Banner Skein Dye Corp, was also previously connected with Brooklyn Yarn Dye Co.

Harry A Batley is one of the 15 members who have been appointed to a new Advisory Board to assist the Newark College of Engineering Research Foundation with research activities.

Mr Batley is executive vice president of the Nopco Chemical Co.

•

Recent additions to the staff of Emery Industries, Inc's Development and Service Department include *Joseph J Seiwert, Fred C Stroehlein, Jack Boylan,* and *Paul M Clark.* All have been assigned to the Applications Section, under the direction of *R D Aylesworth,* manager.

Mr Stewart joined Emery during his undergraduate years on a co-op basis. Mr Stroehlein went with Emery from Ander Chemical Co, Mr Boylan from Jones Dabney Co, and Mr Clark from Thermocor Co, Inc.

Additions to Emery's Research Department include *Herbert G Rodenberg, Paul J Kemper,* and *John F Morrow.*

Mr Rodenberg is engaged in the investigation of oleochemical derivatives in Emery's Derivatives Section, working under the direction of *H F Oehschlaeger,* Section Manger. Prior to joining Emery, he was associated with U S Industrial Chemicals Co in Tuscola, Ill.

Mr Kemper is also a member of the Derivatives Section. He was formerly with Interchemical Corp's Finishing Division in Cincinnati.

Mr Morrow is working in the Polymerization Section, which is headed by *F O Barrett.*

Paul F O'Neil has been appointed to the chemical research staff of Crown Chemical Corp, Providence RI, to be responsible for the company's manufacturing process development.

Formerly a chemist with the research and development staff of Warwick Chemical Co, Division of Sun Chemical Corp, Mr O'Neil was most recently a plant chemist for Synthron, Inc.

•

Walter B Jenkins celebrated his fiftieth year of continuous active service in the chemical industry on February 1. The event was marked February 4 at The Hickory House in Worcester, Mass, when he was guest of honor at a dinner attended by his colleagues of Marble-Nye Co and Hooker Chemical Corp.

Several members of Hooker Chemical's top management were on hand to honor Mr Jenkins, one of the deans of the chemical industry. Widely known throughout New England, he is the former president of Marble-Nye Co, one of the nation's earliest firms, and also reputedly New England's oldest active chemical distributor. It was established in 1773 by Elijah Dix, who merchandized drugs and dyestuffs. Marble-Nye Co was acquired by Hooker in 1953 as a sales subsidiary.

Mr Jenkins' customers through the years have been largely companies in the textile and paper industries, municipalities for water purification and state purchasing agencies throughout New England.

OBITUARY

DYER MOSS

DYER SPRING MOSS, a prominent figure in the dyestuffs business for nearly fifty years, died recently after a short illness at his home in Charlotte, NC. Until January 1, 1959, Mr Moss was owner and president of his own company, Dyer S Moss Co, Charlotte, NC. Since June, 1959, he had served as Southern representative for Johnson and Johnson.

Mr Moss was born in Paterson, NJ, on Aug 11, 1892. Following his graduation from New York University, he went South, practically as a "pioneer" in the dyestuff business, for the old Newport Chemical Works of Passaic, NJ. He continued to work for Newport after the firm was bought up by the DuPont Company. Following some later service with National Aniline Div for a number of years he decided to go into business for himself at the beginning of World War II as a manufacturers' representative.

Dyer S Moss

Among the companies he represented were Carbic Color and Chemical Co, of which he was later made president; Otto B May, Inc; Pfister Chemical Co; and Refined Products Corp.

Following a heart attack about two years ago, he decided to sell his business properties. At his death, he was working for Refined Products Corp, which was recently sold to Johnson and Johnson.

Mr Moss is survived by his wife, the former Helen Newton; one son, Dyer Spring Moss Jr; two daughters, Mrs William Craddock and Mrs W B Lavender; two sisters, Mrs Dan Isles and Fannie Moss; and three grandchildren.

MRS G O LINBERG

MRS GEO O LINBERG died suddenly in her home in Newtonville, Mass on January 23, 1960.

The wife of Geo O Linberg, 14th president of AATCC, Mrs Linberg began attending National Conventions in 1946 on the occasion of the Association's Silver Jubilee and served as a member of the Ladies Committee in connection with all subsequent conventions. She was an Honorary Member of the Northern New England Section.

Surviving are her husband, George O; a daughter, Mrs F J West of Muskegon, Mich; seven grandchildren; and a brother, William H Voight, of Northampton, Mass.

TECHNICAL LITERATURE

(Literature is available from sources shown in italics)

AN INDUSTRIAL WASTE GUIDE TO THE COTTON TEXTILE INDUSTRY—25¢; *Supt of Documents, U S Government Printing Office, Washington 25, DC*—This 26-page illustrated booklet is the fifth of a series of Industrial Waste Guides prepared by the National Technical Task Committee on Industrial Wastes in cooperation with the Public Health Service, U S Dept of Health, Education, and Welfare.

In the Cotton Textile Industry, as in many other industries, the control and disposal of wastes is of major concern. There are two important reasons for increased attention to these problems: first, the need for reducing wastes in order to achieve the most economical production in small as well as large plants; second, the need for protecting the Nation's limited water resources for maximum use essential to health and to continued economic growth. Stream pollution control is mutually beneficial to industry, the individual citizen, and the Nation as a whole. Thus, wastes which cannot be eliminated must be disposed of in a manner which will not impair the usefulness of stream waters for other beneficial purposes.

This *Industrial Waste Guide to the Cotton Textile Industry* is intended primarily to assist the operators and managers of cotton textile processing plants to utilize, reduce, and otherwise suitably dispose of their waste waters. It will also be useful in informing consultants and personnel of regulatory agencies of the sources and pollutional characteristics of cotton textile wastes and the status of developments in waste treatment. This guide was prepared by the National Stream Sanitation Committee of the American Association of Textile Chemists and Colorists, under the direction of R Hobart Souther.

The National Technical Task Committee on Industrial Wastes is composed of representatives from the Nation's leading industries concerned with solving difficult industrial waste problems. The objective of the organization is to perform technical tasks pertaining to industrial wastes in cooperation with the Public Health Service and all others concerned with improving the quality of our water resources. The preparation of this guide was one of the tasks assumed by the Textile Industry in carrying out this objective.

The booklet is divided into the following categories:
Introduction.

Description of Process—Opening, cleaning, carding, and spinning; slashing and weaving; dyeing and finishing.

Sources, Characteristics, and Pollution Effects of Process Wastes—The meaning of "pollution"; slasher, desizing, kier, bleaching, mercerizing, dyeing, miscellaneous and composite wastes.

Remedial Measures—Inplant reduction of processing wastes (reduction of waste volume, reduction of process chemicals, recovery and reuse of chemicals, process modification, substitution of chemicals, good housekeeping); Treatment of processing wastes (separation of wastes, equalization and storage, screening, mechanical filtration, aeration, neutralization, chemical precipitation, chemical oxidation, biological oxidation, sludge disposal, and disposal to municipal sewage treatment systems).

The Solution of Specific Waste Problems.
Summary.
Bibliography (59 references).

BAKELITE BRAND FIBROUS RESINS AS NONWOVEN TEXTILE BINDERS—*Union Carbide Plastics Co, 420 Lexington Ave, New York 17, NY*—New physical forms of both vinyl and styrene resins is the subject of this new release, which discusses the economical possibilities offered by these materials in the production of denser types of nonwovens.

●

BULK HANDLING AND STORAGE OF SULFURIC ACID AND OLEUM, CHLOROSULFONIC ACID, AND MURIATIC ACID—*Inorganic Chemicals Div, Monsanto Chemical Co, 800 N Lindbergh Blvd, St Louis 66, Mo*—Illustrated bulletins I-181, I-182, and I-183 are designed to give technical assistance in setting up safe procedures in the bulk unloading, handling and storage of the materials. Each publication covers shipments, tank car dome fittings, tank truck pipe fittings, factors to consider in determining storage tank sizes, construction materials, level indication, tank car and tank truck unloading methods, product sampling, safety, etc.

●

CHANGES IN AMERICAN TEXTILE INDUSTRY—COMPETITION, STRUCTURE, FACILITIES, COSTS—*Technical Bulletin 1210, Office of Information, U S Dept of Agriculture, Washington 25, DC*—Prospective demand for textiles indicates that consumption of American cotton and wool can be maintained or expanded if all potential markets are fully exploited, according to this technical bulletin. This is true even in the face of strong competition from synthetic and foreign-grown fibers, the researchers conclude.

To meet this competition successfully and expand market outlets, Agricultural Marketing Service economists point out, would require that adequate and dependable supplies of suitable qualities of cotton and wool be made readily available to users at competitive prices. This, in turn would require improved efficiency in producing and marketing cotton and wool and in manufacturing and distributing the products, it was found.

The bulletin presents figures on changes in facilities, margins, and costs for assembling and merchandising raw cotton and wool; for manufacturing yarns, fabrics, apparel, and household goods made of cotton and wool; and for wholesale and retail distribution of these products. Similar figures are also shown for man-made fibers and silk. Means and importance of improvements for each segment of the industry are suggested.

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CHROMALOX CAST-IRON ELECTRIC IMMERSION HEATERS—*Edwin L Wiegand Co, 7500 Thomas Blvd, Pittsburgh 8, Pa*—Bulletin PD106 lists and describes advantages of electric heating. It also contains information necessary for selecting the proper type and capacity heater for different type metals and heat-up time.

●

COMPILATION OF ASTM STANDARDS ON TEXTILE MATERIALS, D-13 (WITH RELATED INFORMATION)—*$8.50; American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa*—The many ASTM standards developed by Committee D-13 on Textile Materials cover the widely used products of this industry. They provide methods of tests, tolerances within which textiles must come in order that they shall constitute good delivery on contract, and specification

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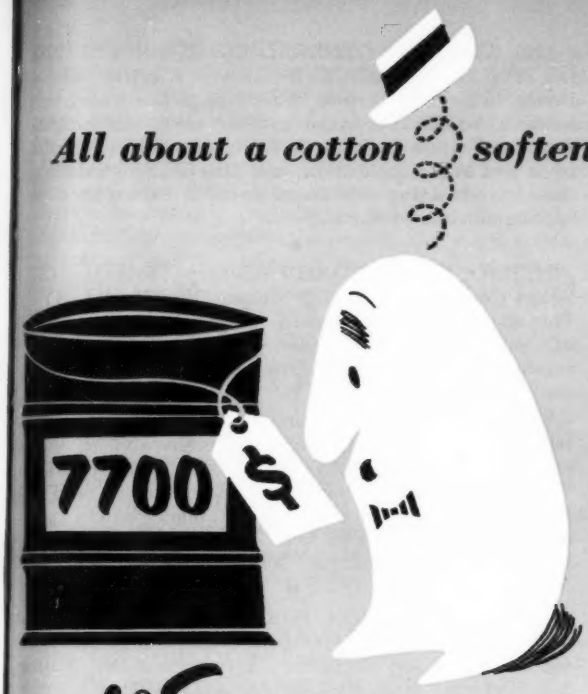

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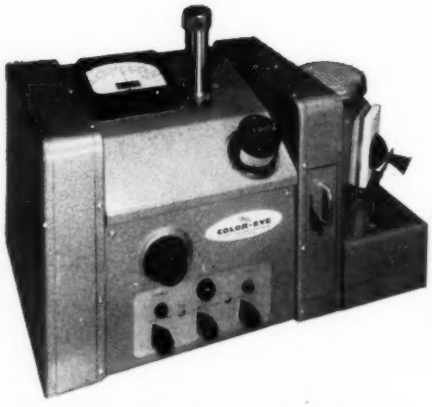

This unique combination of a colorimeter and abridged spectrophotometer measures color differences directly or against a permanent reference standard. For use in production or laboratory, Color-Eye is completely portable, rugged and stable.

FOR THE TEXTILE INDUSTRY . . .

COLOR-EYE provides a means for rapidly correcting "depth of shade" and "cast". Color-Eye can also be used to establish specifications for dyestuffs, bleached goods and finished goods.

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requirements—standards of quality.

The 1959 edition contains 134 standards of which 23 are new, revised or have had their status changed recently.

Included are terms, definitions, specifications for testing machines, methods for humidity testing, sampling, interlaboratory testing, quantitative and qualitative analysis, resistance to insect pests and microorganisms, fibers, yarns, threads, and cordage. Also included are standards for fabrics, nonwoven fabrics, hosiery, carpets, tire cord, asbestos textiles, bast and leaf fiber textiles, kraft yarns, cotton textiles; glass, man-made fiber and wool textiles. In addition there are 15 extensive appendices.

This compilation provides in compact, convenient form, data and information of great importance to all who deal with textile materials.—*924 pages, hard cover, 6 × 9″.*

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DAREX VINYL ACETATE HOMOPOLYMER AND COPOLYMER EMULSIONS—*Dewey & Almy Chemical Div, W R Grace Co, Cambridge 40, Mass*—Brochure discusses properties and suggested applications, and also serves as a jacket for filing D&A technical data sheets.

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DESIZING MANUAL—*Pabst Brewing Co, Industrial Products Div, Merchandise Mart, Chicago 54, Ill*—This booklet discusses the application of Pabst desizing agents in the textile industry (Exsize, Super Exsize and Exsize HA). A brief outline of the more commonly used textile mill processes, especially as practiced in cotton work, with emphasis on desizing and resulting benefits is presented. Since many of the same processes, including desizing, also apply to spun rayons, rayon and cotton mixtures and other synthetic fibers, these are mentioned briefly.

A special feature of the booklet is flow sheet showing the various procedures used in cotton and rayon finishing plants.

•

1960 EDITION, PHYSICAL PROPERTIES—SYNTHETIC ORGANIC CHEMICALS—*Union Carbide Chemicals Co, Div of Union Carbide Corp, 30 East 42nd St, New York 17, NY*—This new 28-page "Physical Properties" booklet describes more than 400 synthetic organic chemicals.

The booklet contains information on applications, physical properties, and shipping data. Included are alcohols; acids; anhydrides; chlorine compounds; esters; ethers and oxides; glycol-ethers; glycols and triols; ketones; monomers; Carbowax polyethylene glycols; metallic salts; nitrogen compounds; cyclic compounds; Flexol plasticizers; polypropylene glycols; Ucon fluids, lubricants, and fluorocarbons; Tergitol surfactants; Polyox water-soluble resins; Cellosize hydroxyethyl cellulose; new chemicals for evaluation; and chemicals for special applications.

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GEIGY SURFACTANTS—*Geigy Industrial Chemicals, Div of Geigy Chemical Corp, Ardsley, NY*—This attractive, 8-page brochure offers technical data and lists various applications for Geigy surfactants, ie, Sarkosyl n-acyl sarcosines, Nonisol nonionic surfactants, alkanolamide nonionic surfactants, and amines, all of which have textile applications. Also listed, along with formula and properties and application data, are the following: Alrowet D-65, Sorbit AC, Belloid TD, Alrosperse 100, Quaternary O, Alrodyne Emulsifiers, Corrosion Inhibitor NPA, and Diasyl L.

1960 GUIDE TO GENERAL ELECTRONIC'S LINE OF SILICONE PRODUCTS—*General Electric Silicone Products Dept, Waterford, NY*—8-page illustrated bulletin CDS-129B lists major product users and benefits. This publication features G-E silicones for textile finishes and other applications and also contains information for obtaining additional detailed information on specific silicone products.

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HYDROGEN PEROXIDE—*Solvay Process Div, Allied Chemical Corp, 61 Broadway, New York 6, NY*—This 63-page booklet presents practical information on the properties of hydrogen peroxide and its water solutions, and on the handling, dilution and storage of the product.

The booklet contains numerous charts, graphs and tables which are particularly comprehensive in those sections dealing with physical and chemical properties. Illustrations point out methods and equipment used for shipping, unloading and bulk storage. Safety precautions are detailed at some length as are analytical procedures and techniques for accurate dilution.

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INSTRUMENTATION FOR TREATMENT OF INDUSTRIAL WASTES—*Industry Bulletin B 97-2, Minneapolis-Honeywell Regulator Co, Industrial Div, Wayne and Windrim Aves, Philadelphia 44, Pa*—This bulletin is a compilation of article reprints from *Instrumentation* magazine. It offers some case histories of how instruments are applied to industrial waste treatment systems to prevent stream pollution. The bulletin should be particularly helpful to anyone with a waste treatment problem, because it tells "how the other fellow does it."

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ITACONIC ACID AND ESTERS—*Chemical Sales Div, Chas Pfizer & Co, Inc, 630 Flushing Ave, Brooklyn 6, NY*—The following information on itaconic acid and esters is available from Chas Pfizer & Co, Inc:

Polymerization of Itaconic Acid (5 pages, 18 literature references)—Homopolymerization; Copolymerization—other acids, acrylonitrile, acrylates and methacrylates, butadiene, styrene, vinylidene chloride, other copolymers.

Homopolymerization of Dialkyl Itaconates (10 pages, 11 literature references, 8 tables, 1 illustration)—Introduction; Methods of Polymerization—bulk, solution, suspension, emulsion; Properties of Dialkyl Itaconate Polymers.

Copolymerization of Dialkyl Itaconates (13 pages, 33 literature references, 10 tables)—Introduction; Monomer Reactivity Ratios; Copolymerization of All-Itaconate Systems, Acrylonitrile Copolymers with Allyl Derivatives; Butadiene Copolymers; Copolymers with Acrylates and Methacrylates; Styrene Copolymers; Vinyl Chloride Copolymers; Other Copolymers.

Typical Properties of Itaconic Acid Refined and Esters.

Typical Properties of Itaconic Esters.

Inhibitor Content of Itaconic Acid and Esters.

Toxicology of Itaconic Acid and Esters—Itaconic Acid—oral toxicity, dermal irritation, eye irritation; Itaconic Esters—dermal irritation, eye irritation.

Handling and Storage of Itaconic Acid and Esters.

Test Methods—intrinsic viscosity, emulsion viscosity, preparation of films, test conditions for films, tensile strength and elongation, impact elongation, adhesion, hardness, water vapor permeability, second order transition temperatures.

JAGUAR—GUAR GUM BY STEIN HALL—Jaguar *Dept, Stein Hall & Co, Inc, 285 Madison Ave, New York 17, NY*—A new edition of this 16-page booklet contains additional information about the physical and chemical properties of guar gum (Jaguar®) gained by Stein Hall in the period following publication of the first edition in 1956, New sections contain such information as Jaguar's viscosity vs shear rate, electrolyte compatibility, properties as a setting, filtering and flotation agent and the effect of temperature on Jaguar's viscosity.

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KETONES AS SOLVENTS AND CHEMICAL INTERMEDIATES—*Union Carbide Chemicals Co, 30 East 42nd St, New York 17, NY*—48-page booklet has up-dated data on fifteen ketones and diketones that are available in commercial quantities from Carbide. It includes information on applications, coatings, formulations, physical properties, solvent properties, constant-boiling mixtures, shipping, storage, handling, physiological properties, specification limits, and test methods. A comprehensive bibliography on ketones and their uses is a feature of the new publication.

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1960 LISTING OF PRODUCTS OF UNION CARBIDE CORPORATION—*Union Carbide Corp, 30 E 42nd St, New York 17, NY*—Contents of this 16-page brochure include: trade marks of Union Carbide, sales offices of Union Carbide divisions and subsidiaries, a 10-page alphabetical listing of products, and a condensed summary of UC products.

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MORNINGSTAR-PAISLEY HAS ALREADY TOUCHED YOUR LIFE SEVERAL TIMES TODAY—*Morningstar-Paisley, Inc, 630 West 51st St, New York 18, NY*—This 8-page booklet will be of interest to all fields in which starches, dextrines, processed water-soluble gums, adhesives, and other specialty chemicals are used.

The booklet lists the industries and manufactured goods where Morningstar-Paisley products are used, gives the origin of the raw materials, and offers concise descriptions of the processed starches, gums, adhesives, etc.

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PLIOLITE LATEX 140—*Chemical Div, The Goodyear Tire & Rubber Co, Akron 16, O*—PLL-12 offers typical properties of Pliolite Latex 140, a water dispersion of a styrene/butadiene copolymer (60/40) containing a nonstaining antioxidant system. Formulations are offered for carpet scrim adhesive, upholstery backing, and carpet and rug backing.

•

PULSAFEEDER METERING PUMPS IN PROCESS INDUSTRIES—*Lapp Insulator Co, Inc, Process Equipment Div, 112 Hall St, LeRoy, NY*—28-page Catalog 59 includes the following information: how the Pulsafeeder can be used; types of hard-to-pump fluids which the metering pumps can handle; a detailed description (with drawings) on how the Pulsafeeder works; and various type reagent heads available for effective metering of difficult fluids.

Photographs and editoral material in the booklet are also devoted to special sections on autopneumatic and electronic controls, as well as descriptions and illustrations of metering pumps available for all types of process service. Included are two pages of tables showing capacities, sizes, and specifications on the various types of Pulsafeeders.

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RETAIL EXECUTIVE'S GUIDE TO FIBERS, FABRICS, FINISHES—*Dow Corning Corp, Dept 991, Midland, Mich*—The first of a series of monthly bulletins written especially for retail merchandise managers, buyers, and sales personnel, spotlighting up-to-date information on textile fibers, fabrics, and finishes, has been issued as a service to the textile industry by Dow Corning Corporation, manufacturer of Syl-mer grade silicone finishes for textiles and leather.

Purpose of the bulletins, according to the company, is to help dispel the existing confusion on these textile subjects in the minds of retail executives, for more profitable promotion of current merchandise. The importance of an informed retail trade will be accentuated by the new federal labeling act.

The first bulletin, which has been mailed to retailers throughout the United States, briefly traces the "revolution" in the textile industry during the past 40 years with the introduction of new man-made fibers and their impact on the market.

The bulletins are printed in 4-page fact sheet format punched for notebook binder reference use.

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SINGE SECTIONS—*Birch Bros, Inc, 32 Kent St, Somerville 43, Mass*—Circular number BB895 describes and illustrates and describes a vertical four red ray burner singe section, equipped to handle one or two strands of cloth.

On the reverse side, a horizontal open-flame ribbon singe section for corduroys is illustrated and described.

•

SOLVOFEN HM—*Antara Chemicals, a sales division of General Aniline & Film Corp, 435 Hudson St, New York 14, NY*—A new bulletin describing the properties and applications of a dyeing assistant and solvent.

Solvofen HM is said to be finding increasing application in the textile, paper manufacturing and printing fields. It is reported to be especially useful in high-speed, continuous dyeing operations.

Antara Chemicals states that the chemical is a substituted pyrrolidone with unique solvent and dispersing properties, making it particularly suitable for promoting better dye penetration of hard-twisted yarns, bulky fabrics and tightly woven cloth. It also is said to aid leveling on both fibers and piece goods. In addition, it reportedly is used to remove colorants and other residues from padder rolls, tenter frames, and paper mill woolen felts, as well as equipment used in graphic arts printing.

Solvofen HM is described as chemically stable, completely miscible with water and most organic solvents, nonfoaming, nonvolatile, and noncorrosive.

The brochure lists specific uses in textile applications, both with natural and synthetic fibers, lists potential uses in pasting and dispersing of certain classes of dyestuffs, and describes cleaning procedures involving removal of dyestuffs and pigments from rubber and metal equipment as well as woolen felts. Product data is also given.

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SURFACE-ACTIVE AGENTS—*Onyx Oil & Chemical Co, Jersey City 2, NJ*—24-page catalog describes each product by trade name, active ingredient, percent activity, physical state, general use, specific applications and properties.

The products are divided into three general classes: anionic, cationic and nonionic. There is a 2-page section explaining the chemistry of each of these groups.

•

SYTON DS (COLLOIDAL SILICA DISPERSION) FOR USE IN TEXTILE PROCESSING AND FINISHING—*Inorganic Chemicals Div, Monsanto Chemical Co, 800 N Lindbergh Blvd, St Louis 66, Mo*—Syton DS, Monsanto states, is widely used in the textile industry, and is a functional additive which may be combined with regular finishing resins or used alone for fabric finishing. It is used to control yarn slippage, modify hand and control luster.

Revised technical bulletin I-110 covers use for protecting weave structure, protection of low-end construction, for imparting crisp, dry hand, controlling fabric sheen, etc, and includes discussion of application methods and product properties. A special section describes application of the product as a spinning aid for cotton in the field during harvest rather than at mill level.

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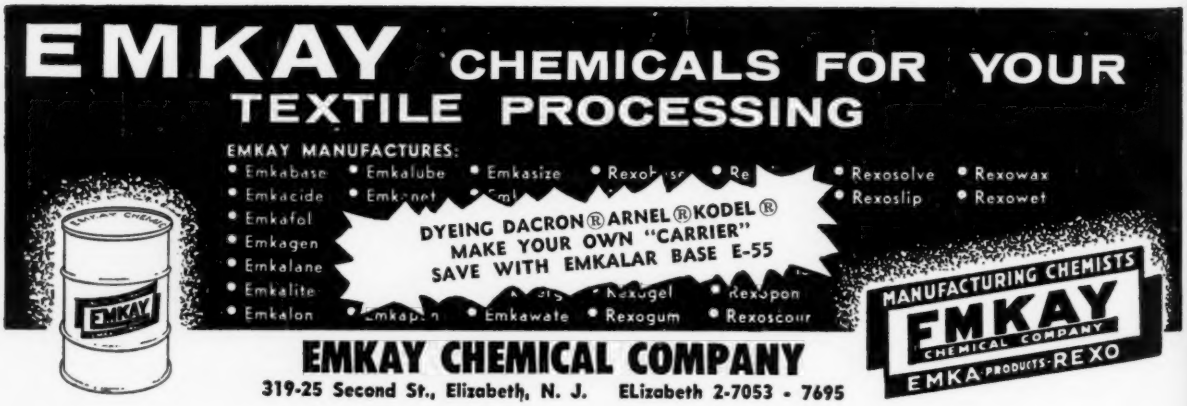
TETRAPOTASSIUM PYROPHOSPHATE—*Inorganic Chemicals Div, Monsanto Chemical Co, 800 North Lindbergh Blvd, St Louis 66, Mo*—TKPP has assumed a major role in the detergent industry because it combines high solubility with outstanding water softening, emulsifying, dispersing and deflocculation properties.

The data sheets include chemical analysis and physical constant tables of TKPP as well as paragraphs describing the product's solution clarity, solubility, stability, sequestering action and synergistic value. Typical formulations for general-purpose liquid detergents and a liquid home-laundry detergent also are included.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